FROM FREE RIDERS TO FAIR FOLLOWERS: GLOBAL COMPETITION UNDER THE TRIPS AGREEMENT©

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I. INTRODUCTION

The Uruguay Round of Multilateral Trade Negotiations brought developed and developing countries into an integrated world market in which the Agreement on Trade-Related Aspects of Intellectual Property Rights [TRIPS] has established a basic framework[1] for balancing legal incentives to create against the public interest in free competition.[2] Previous efforts to achieve a worldwide consensus along these lines were hampered by the limited participation of developing

1. *See* Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations, *done at* Marrakesh, Morocco, April 15, 1994 [hereinafter Final Act], *reprinted in* THE RESULTS OF THE URUGUAY ROUND OF MULTILATERAL TRADE NEGOTIATIONS: THE LEGAL TEXTS 2-3 (GATT Secretariat ed., 1994) [hereinafter RESULTS OF THE URUGUAY ROUND]; Marrakesh Agreement Establishing the World Trade Organization [hereinafter WTO Agreement], Annex 1C: Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994 [hereinafter TRIPS Agreement], *reprinted in* RESULTS OF THE URUGUAY ROUND, *supra*, at 6-19, 365-403. While Congress authorized the President to accept the Uruguay Round Agreements and implement the WTO Agreement, *supra*, art. VIII, it denied domestic legal effect to the Uruguay Round Agreements as such, and it excluded private actions under those Agreements. *See* Uruguay Round Agreements Act, Pub. L. No. 103-465, secs. 101-103, 108 Stat. 4809, 4814-4819 (1994).

2. *See, e.g.*, ROBERT P. BENKO, PROTECTING INTELLECTUAL PROPERTY RIGHTS: ISSUES AND CONTROVERSIES 12-25 (1987); EDWARD S. YAMBRUSIC, TRADE-BASED APPROACHES TO THE PROTECTION OF INTELLECTUAL PROPERTY 7-24 (1991). For an historical view of the economics of intellectual property rights, see also Paul A. David, *Intellectual Property Institutions and the Panda's Thumb: Patents, Copyrights, and Trade Secrets in Economic Theory and History, in* GLOBAL DIMENSIONS OF INTELLECTUAL PROPERTY RIGHTS IN SCIENCE AND TECHNOLOGY (Mitchel B. Wallerstein et al. eds., 1993).

countries in the mature intellectual property systems practiced in technology exporting countries and by the prevalence of centrally planned or command economies in some developed and many developing countries.[3] The TRIPS Agreement, which came into force after the worldwide collapse of the command economies, radically alters this picture.[4] Even as the other multilateral trade agreements comprising the Uruguay Round open markets everywhere to a wider array of both traditional and non-traditional products,[5] it holds all World Trade Organization [WTO] member countries to a common core of relatively well-established intellectual property norms.[6] How

3. *See, e.g.*, A. Samuel Oddi, *The International Patent System and Third World Development: Reality or Myth*, 1987 DUKE L.J. 831 (justifying the limited participation of Third World countries in an international patent system); J.H. Reichman, *Intellectual Property in International Trade: Opportunities and Risks of a GATT Connection*, 22 VAND. J. TRANSNAT'L L. 747, 751-66 (1989) [hereinafter Reichman, *GATT Connection*] (contrasting views of developed and developing countries in pre-TRIPS negotiations). *See also* Martin J. Adelman & Sonia Baldia, *Prospects and Limits of the Patent Provisions in the TRIPS Agreement: The Case of India*, 29 VAND. J. TRANSNAT'L L. 507, 518-28 (1996) (showing new opportunities for India's pharmaceutical industry under the TRIPS Agreement).

4. *See, e.g.*, Adolf Dietz, *Intellectual Property and Desocialization in Eastern Europe*, 26 INT'L REV. INDUS. PROP. & COPYRIGHT L. 851 (1995); Symposium: *Intellectual Property in East Asia*, 13 UCLA PAC. BASIN L. J. 1 (1994).

5. *See, e.g.*, WTO Agreement, *supra* note 1, Annex 1A: Multilateral Agreements on Trade in Goods, Marrakesh Protocol to the General Agreement on Tariffs and Trade 1994 *in* RESULTS OF THE URUGUAY ROUND, *supra* note 1, at 20, 37-38 (implementing schedule of broad new tariff reductions in five phases); Paul Demaret, *The Metamorphoses of the GATT: From the Havana Charter to the World Trade Organization*, 34 COLUM. J. TRANSNAT'L L. 123, 133-38 (1995) (single package system and trade in goods); *id.*, at 139-55 (other multilateral agreements); *id.*, at 155-62 (the plurilateral trade agreements). *See also* David W. Leebron, *An Overview of the Uruguay Round Results*, 34 COLUM. J. TRANSNAT'L L. 11, 12-28 (1995); Symposium, *Uruguay Round—GATT/WTO*, 29 INT'L LAW. 335 (1995).

6. "The TRIPS Agreement is the most ambitious international intellectual property convention ever attempted. The breadth of subject matters comprising the 'intellectual property' to which specific minimum standards apply is unprecedented [*see* TRIPS Agreement, *supra* note 1, art. 1(2)], as is the obligation of all WTO member states to guarantee that detailed enforcement procedures as specified in Part III of this Agreement are available under their national laws so as to permit effective action against any act of infringement of covered intellectual property rights. . . . In addition, each member state pledges its willingness to incur liability in the form of cross-collateral trade sanctions for the nullification and impairment of benefits owed other member states under the Uruguay Round's package deal." J.H.

both developed and developing countries implement the TRIPS Agreement[7] will therefore determine the future level of competition on the global market for knowledge goods that emerged from the Uruguay Round.[8]

In principle, the TRIPS Agreement should replace a patchwork system of territorial regulation (that allowed free-riders in some countries readily to appropriate the fruits of foreign investment in technical innovation[9]) with a global

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Reichman, *Compliance with the TRIPS Agreement: Introduction to a Scholarly Debate*, 29 VAND. J. TRANSNAT'L L. 363, 366-67 (1996) (citing authorities) [hereinafter Reichman, *Compliance with TRIPS*]. *See generally* Adrian Otten & Hannu Wager, *Compliance with TRIPS: The Emerging World View*, 29 VAND. J. TRANSNAT'L L. 391 (1996); J.H. Reichman, *Universal Minimum Standards of Intellectual Property Protection under the TRIPS Component of the WTO Agreement*, 29 INT'L LAW. 345 (1995) [hereinafter Reichman, *Universal Minimum Standards*].

7. Besides its national treatment and most-favored-nation [MFN] clauses, the TRIPS Agreement holds all member countries to a common set of international minimum standards of intellectual property protection. *See* TRIPS Agreement, *supra* note 1, arts. 3, 4, 65, 66. During a transitional period, however, developing countries may postpone implementing most of the required standards for a period of at least five years, and they may wait ten years before fully protecting fields of technology that were previously excluded under their domestic patent laws. Least-developed countries [LDCs] obtain a general reprieve for ten years from implementing the standards (but not national treatment or MFN), while a showing of hardship may qualify them for further delays and other concessions. *See, e.g.*, Otten & Wager, *supra* note 6, at 407-09; Reichman, *Universal Minimum Standards*, *supra* note 6, at 353 (citing authorities and noting pipeline provision for pharmaceutical and agrochemical patents). *See also id.*, at 383 (noting that LDCs may obtain future waivers to alleviate hardships stemming from their obligations under the WTO Agreement as a whole, by virtue of Article XI(2) of that Agreement).

8. *See, e.g.*, Ruth L. Gana, *Prospects for Developing Countries under the TRIPS Agreement*, 29 VAND. J. TRANSNAT'L L. 735, 744-68 (1996); Marco C.E.J. Bronckers, *The Impact of TRIPS: Intellectual Property Protection in Developing Countries*, 31 COMMON MKT. L. REV. 1245 (1994); J.H. Reichman, *Implications of the Draft TRIPS Agreement for Developing Countries as Competitors in an Integrated World Market*, United Nations Conference on Trade and Development, Discussion Paper No. 73 (UNCTAD/OSG/DP/73, Nov. 1993) [hereinafter Reichman, *TRIPS and Developing Countries*]. *See also* J.H. Reichman, *Intellectual Property in International Trade and the GATT*, in EXPORTING OUR TECHNOLOGY: INTERNATIONAL PROTECTION AND TRANSFERS OF INDUSTRIAL INNOVATIONS 3, 8-12 (Mistrale Goudreau et al. eds., 1995) [hereinafter Reichman, *Intellectual Property and the GATT*].

9. *See, e.g.*, RICHARD D. ROBINSON, THE INTERNATIONAL TRANSFER OF TECHNOLOGY—THEORY, ISSUES, AND PRACTICE 145-48 (1988); Kenneth W.

competitive framework built around the international minimum standards of protection adopted for specified intellectual creations.[10] A growing, worldwide commitment to the competitive ethos should then facilitate the implementation process and help to reduce friction by providing some common ground in contentious cases.[11] In practice, however, any given state's approach to compliance with this Agreement will vary with its own national innovation strategy and with the for-

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Dam, *The Growing Importance of International Protection of Intellectual Property*, 21 INT'L. LAW. 627 (1987); *see also* Marshall A. Leaffer, *Protecting United States Intellectual Property Abroad: Toward a New Multilateralism*, 76 IOWA L. REV. 273 (1991).

10. The TRIPS Agreement mandates compliance with the main substantive provisions of the Berne and Paris Conventions, as well as with selected provisions of the Rome Convention on Neighboring Rights and of the Washington Treaty on integrated circuit designs. *See* TRIPS Agreement, *supra* note 1, arts. 1(3), 2, 3(1), 9(1), 14, 35; Paris Convention for the Protection of Industrial Property, Mar. 20, 1883, *as last revised* at Stockholm, July 14, 1967, 21 U.S.T. 1583, 828 U.N.T.S. 305 [hereinafter Paris Convention]; Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, *as last revised* at Paris, July 24, 1971, 828 U.N.T.S. 221 [hereinafter Berne Convention]; International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations, *adopted* at Rome, Italy, Oct. 26, 1961, 496 U.N.T.S. 43 [hereinafter Rome Convention]; Treaty on Intellectual Property in Respect of Integrated Circuits, *opened for signature* at Washington, D.C., May 26, 1989, 28 I.L.M. 1477 [hereinafter IPIC Treaty]. The United States is not a party to the Rome Convention. *See also* Sam Ricketson, *The Future of the Traditional Intellectual Property Conventions in the Brave New World of Trade-Related Intellectual Property Rights*, 26 INT'L REV. INDUS. PROP. & COPYRIGHT L. 872 (1995).

The TRIPS Agreement identifies seven categories of "intellectual property" that are subject to the international minimum standards it directly establishes, in addition to national treatment, MFN, and standards arising from prior international conventions. *See supra* note 6. These categories include (1) copyrights and related rights; (2) trademarks and (3) geographical indications; (4) industrial designs; (5) patents; (6) integrated circuit designs; and (7) trade secrets or confidential information. *See* TRIPS Agreement, *supra* note 1, arts. 1(2), 3(1), 4, 9-40. An eighth subject-matter category mentioned in Part II of the Agreement (but not included within the definition of "intellectual property") is entitled "Control of Anti-Competitive Practices in Contractual Licenses." *See id.*, art. 40. *See generally* Reichman, *Universal Minimum Standards*, *supra* note 6, at 347-51, 379-81.

11. *Cf., e.g.*, Ernesto Tironi, *Some Lessons From the Uruguay Round: Reflections of a Developing Country Trade Negotiator*, *in* UNCTAD REVIEW 1995, UNCTAD/SGO/9 (1995), at 213, 215.

mal and informal industrial policies chosen to effectuate it.[12] In this context, the developed and developing countries appear to be heading in opposite directions,[13] and the tensions engendered by their conflicting interests complicate the process of consolidating the TRIPS Agreement for the immediate future.

This Article identifies the sources of tension between developed and developing countries that current trends are likely to magnify, and evaluates the impact of the TRIPS Agreement on the latter's capacity to acquire the knowledge and skills they need to compete on the market for technologically advanced products and processes. It argues that developing countries have much to gain by accepting the challenge implicit in this Agreement to become fair followers in the worldwide quest for technical innovation.

To sustain this thesis, Part II of the Article contrasts the growing tendency of the developed countries to adopt anti-competitive, high-protectionist industrial policies with the developing countries' new prospects for rapid economic growth under free-market conditions. Part III then outlines a five-pronged, pro-competitive strategy for compliance with the TRIPS Agreement that could potentiate the developing countries' capacities to acquire up-to-date technological knowledge and skills while implementing international minimum standards of intellectual property protection in good faith. The object of the exercise is to explore the "grey" areas that these standards leave to the discretion of WTO member states and to explain the long-term advantages of maintaining a more competitive

12. For recent scholarly emphasis on national innovation strategies, see, e.g., John Zysman, Laura Tyson, Giovanni Dosi, and Stephen Cohen, *Trade Technology and National Competition, in* TECHNOLOGY AND INVESTMENT: CRUCIAL ISSUES FOR THE 1990S, at 185, 187 (Enrico Deiaco et al., eds., 1990) (existence of different development trajectories suggests that "there can be decisive winners and losers in international trade; one nation can create advantages in related sets of industries that its rivals cannot match"). *See also* DENNIS PATRICK LEYDEN & ALBERT N. LINK, GOVERNMENT'S ROLE IN INNOVATION 1-13, 171-174 (1992); Dominique Foray, *General Introduction, in* TECHNOLOGY AND THE WEALTH OF NATIONS 1-22 (D. Foray & C. Freeman eds., 1993).

13. *See infra* text accompanying notes 14-40 (contrasting high-protectionist trend in United States and European Union with low-protectionist interests of developing countries).

position with respect to the acquisition of technical knowledge than that which currently prevails in the developed countries.

Against this background, Part IV of the Article examines the likelihood that the TRIPS Agreement will eventually lead to a global equilibrium between innovators and competitors that transcends the narrow economic policies of nation states. It concludes with a reminder that, until such an equilibrium emerges, any developing country willing to adopt and defend a pro-competitive reading of the TRIPS standards actually represents the interests of consumers and second-comers everywhere, including those in the developed countries themselves.

II. COMPETITIVE ROLE OF THE DEVELOPING COUNTRIES IN AN INTEGRATED WORLD MARKET

In the developed countries, adoption of the TRIPS Agreement seems to have further whetted the protectionist appetites of those powerful industrial combinations that have successfully captured the legislative and administrative exponents of trade and intellectual property policies in recent years. The traditional internal dialogues within these countries have consequently assumed a high-protectionist bias favoring creators and investors, with a concomitant stifling of pro-consumer and pro-competitive voices.[14]

At the forefront of attention are current efforts to adapt both domestic and international copyright laws to transmissions of digitized information products on national telecommunications networks.[15] These proposals could expand the

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14. *See, e.g.*, A. Samuel Oddi, *TRIPS—Natural Rights and a "Polite Form of Economic Imperialism,"* 29 VAND. J. TRANSNAT'L L. 415, 417-26 (1996) [hereinafter Oddi, *TRIPS*] (identifying and disapproving a shift to rhetoric of natural property rights in patent law discourse); Hugh C. Hansen, *International Copyright: An Unorthodox Analysis*, 29 VAND. J. TRANSNAT'L L. 579, 585-93 (1996); Peter A. Jaszi, *Goodbye to All That—A Reluctant (and Perhaps Premature) Adieu to a Constitutionally-Grounded Discourse of Public Interest in Copyright Law*, 29 VAND. J. TRANSNAT'L L. 595, 596 (1996); Keith Aoki, *(Intellectual) Property and Sovereignty: Notes Toward a Cultural Geography of Authorship*, 48 STAN. L. REV. 1293, 1351-52 (1996) (stressing the hardening of intellectual property rights into stronger traditional property rights at expense of worldwide public interest since mid 1970s). *See also* Paul Braendelli, *The Future of the European Patent System*, 26 INT'L REV. INDUS. PROP. & COPYRIGHT L. 813 (1995).

15. *See, e.g.*, Commission of the European Communities, Green Paper: Copyright and Related Rights in the Information Society, COM(95)382 (July 17, 1995); Working Group on Intellectual Property Rights, Information In-

rights of publishers and copyright owners generally while significantly reducing the scope of the traditional fair use doctrine and of other privileged transactions.[16] However, recent proposals for regulating the global information infrastructure within the framework of the Berne Convention were reshaped at a Diplomatic Conference under the auspices of the World Intellectual Property Organization [WIPO] in December, 1996.[17] The new WIPO treaties that emerged from this conference[18] strike a more traditional balance between incentives to create and the interests of both users and consumers.[19]

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frastructure Task Force, Report on Intellectual Property and the National Information Infrastructure (Sept. 1995) [hereinafter White Paper]. *See also* Charles R. McManis, *Taking TRIPS on the Information Superhighway: International Intellectual Property Protection and Emerging Computer Technologies*, 41 VILLANOVA L. REV. 207 (1996); Marci A. Hamilton, *The TRIPS Agreement: Imperialistic, Outdated, and Overprotective*, 29 VAND. J. TRANSNAT'L L. 613, 627-31 (1996); Paul Edward Geller, *Conflicts of Laws in Cyberspace: Rethinking International Copyright in a Digitally Networked World*, 20 COLUM.-VLA J.L. & ARTS 571, 590-95 (1996).

16. *See, e.g.*, Pamela Samuelson, *The Copyright Grab*, WIRED, Jan. 1996, at 4 ("[N]ot since the king of England in the 16th century gave a group of printers exclusive rights to print books in exchange for the printers' agreement not to print heretical or seditious material has a government copyright policy been so skewed in favor of publisher interests and so detrimental to the public interest."); Jessica Litman, *The Exclusive Right to Read*, 13 CARDOZO ARTS & ENT. L. J. 29 (1994); Leslie A. Kurtz, *Copyright and the National Information Infrastructure in the United States*, 18 EUR. INTELL. PROP. REV. 120 (1996).

17. *See, e.g.*, Pamela Samuelson, *The U.S. Digital Agenda at the World Intellectual Property Organization*, 37 U. VA. J. INT'L L. ____ (forthcoming 1997) [hereinafter Samuelson, *Digital Agenda*].

18. WIPO Diplomatic Conference on Certain Copyright and Neighboring Rights Questions, WIPO Copyright Treaty, adopted by the Diplomatic Conference on Dec. 20, 1996, WIPO Doc. CRNR/DC/94, Dec. 23, 1996 [hereinafter WIPO Copyright Treaty]; WIPO Diplomatic Conference on Certain Copyright and Neighboring Rights Questions, Agreed Statements Concerning the WIPO Copyright Treaty, adopted by the Diplomatic Conference on Dec. 20, 1996, WIPO Doc. CRNR/DC/96, Dec. 23, 1996 [hereinafter Agreed Statements Concerning the WIPO Copyright Treaty]; WIPO Diplomatic Conference on Certain Copyright and Neighboring Rights Questions, WIPO Performances and Phonograms Treaty, adopted by the Diplomatic Conference on Dec. 20, 1996, WIPO Doc. CRNR/DC/95, Dec. 23, 1996; WIPO Diplomatic Conference on Certain Copyright and Neighboring Rights Questions, Agreed Statements Concerning the WIPO Performances and Phonograms Treaty, adopted by the Diplomatic Conference on Dec. 20, 1996, WIPO Doc. CRNR/DC/97, Dec. 23, 1996.

19. *See generally* Samuelson, *Digital Agenda*, *supra* note 17.

Whether the developed countries will implement this balance in their domestic laws (rather than the more protectionist approaches rejected at the international level) remains to be seen.

Meanwhile, in both the European Union and the United States, established intellectual property rights are being expanded,[20] new *sui generis* laws are proliferating,[21] and antitrust

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20. In the European Union, *see, e.g.*, Common Position (E.C.) 4/94 adopted by the Council on 7 Feb. 1994, with a view to adopting the European Parliament and Council Directive 94/.../EC of... on the legal protection of biotechnological inventions, 1994 O.J. (C101) 65, together with the Council's Reasons [hereinafter Proposed E.C. Directive on the Legal Protection of Biotechnological Inventions], *reprinted in* SWEET & MAXWELL'S E.C. INTELLECTUAL PROPERTY MATERIALS 96-109 (Anna Boody & Audrey Horton eds., 1994) [hereinafter E.C. INTELLECTUAL PROPERTY MATERIALS]; Council Directive 91/250 of 14 May 1991 on the legal protection of computer programs, 1991 O.J. (L 122) 42, *reprinted in* E.C. INTELLECTUAL PROPERTY MATERIALS, *supra*, 2-8; Council Directive 92/100 of 19 November 1992 on rental right and lending right and on certain rights related to copyright in the field of intellectual property, 1992 O.J. (L 346) 61, *reprinted in* E.C. INTELLECTUAL PROPERTY MATERIALS, *supra*, 11-21; Council Directive 93/98 of 29 Oct. 1993 harmonizing the term of protection of copyright and certain related rights, 1993 O.J. (L 290) 9, *reprinted in* E.C. INTELLECTUAL PROPERTY MATERIALS, *supra*, 33-33. In the United States, *see, e.g.*, Copyright Term Extension Act: Hearings on H.R. 989 Before the Subcomm. on Courts and Intell. Prop. of the House Comm. on the Judiciary, 104th Cong., 1st Sess. (1995) [hereinafter Hearings on H.R. 989].

The latest E.C. proposals could also mandate copyright protection of industrial designs, which would constitute one of the most radical protectionist measures ever. *See* E.C. Amended Proposal for a Directive on the Legal Protection of Designs, *infra* note 21, art. 18; Graeme B. Dinwoodie, *Federalized Functionalism: The Future of Design Protection in the European Union*, paper presented to the Fifth Annual Conference on Intellectual Property Law and Policy, April 4, 1997. For expansionist trends undertaken in the name of harmonization, *see also* HAROLD C. WEGNER, PATENT HARMONIZATION 22-42 (1993); Ysolde Gendreau, *Copyright Harmonization in the European Union and in North America*, 17 EUR. INTELL. PROP. REV. 488 (1995). *See generally* David Nimmer, *The End of Copyright*, 48 VAND. L. REV. 1385 (1995) (criticizing trade-driven approach to domestic and international copyright laws).

21. In the European Union, *see, e.g.*, Directive 96/9/EC of the European Parliament and of the Council of 11 Mar. 1996 on the legal protection of databases, 1996 O.J. (L 77) 20, Mar. 27, 1996 [hereinafter E.C. Directive on Databases]; Proposal for a European Parliament and Council Directive on the Community Design, COM (93) 342 final—COD 463, 1994 O.J. (C29) 20, together with the Commission's Explanatory Memorandum, *reprinted in* E.C. INTELLECTUAL PROPERTY MATERIALS, *supra* note 20, at 290-362; Amended proposal for a European Parliament and Council Directive on the legal protec-

or competition laws are being relaxed with a view to facilitating joint research by natural competitors.[22] If all the proposals

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tion of designs, COM (96) 66 Final—COD 464, 1996 O.J. (C142) 7, May 14, 1996 [hereinafter E.C. Amended Proposal for a Directive on the Legal Protection of Designs], *amending* Proposal for a European Parliament and Council Directive on the legal protection of industrial designs, COM (93) 344 Final—COD 464, 1993 O.J. (C345) 14, Dec. 3, 1993, *reprinted in* E.C. INTELLECTUAL PROPERTY MATERIALS, *supra* note 20, at 362-370; Commission of the European Communities, Green Paper—The Protection of Utility Models in the Single Market, COM (95) 370, July 19, 1995 [hereinafter E.C. Green Paper on Utility Models].

In the U.S., a bill emulating the E.C. Directive on Databases, *supra*, was recently introduced. *See* A Bill to amend Title 15, USC, to promote investment and prevent intellectual property piracy with respect to databases, H.R. 3531, 104th Cong., 2d Sess. (1996). The U.S. Semiconductor Chip Act of 1984, *see infra* note 240, became the model for international minimum standards concerning integrated circuit designs that were incorporated into the TRIPS Agreement. *See infra* notes 214, 240-243 and accompanying text (noting that all countries must adopt a *sui generis* regime under TRIP Agreement arts. 35-38, which confers short-term, copyright-like protection on semiconductor chip designs). For recent international action to strengthen the *sui generis* protection of plant varieties, *see infra* note 246 and accompanying text (fearing that the revised UPOV framework may favor multinational firms at the expense of local breeders).

22. In the U.S., *see, e.g.*, the National Cooperative Research and Production Act of 1993, Pub. L. No. 103-42, 107 Stat. 1179 (1993), *codified* at 15 U.S.C. secs. 4301-4305, *amending* National Cooperative Research Act of 1984, Pub. L. No. 98-462, Oct. 11, 1984 (encouraging collaboration among competitors in research and development and production efforts under judge-made "rule of reason" test and by limiting liability to actual, not treble, damages if joint ventures file advance notice with antitrust authorities); U.S. Dept. of Justice and Federal Trade Commission, Antitrust Guidelines for the Licensing of Intellectual Property sec. 3-1 (Apr. 16, 1995); WILLIAM C. HOLMES, INTELLECTUAL PROPERTY AND ANTITRUST LAW secs. 13.01-13.03 (1996). A bill to further weaken antitrust regulation of intellectual property licenses is currently pending before Congress. *See* Intellectual Property Antitrust Protection Act of 1995, H.R. 2674, 104th Cong., 1st Sess. (1995). *See also* Thomas A. Piraino, Jr., *Reconciling Competition and Cooperation: A New Antitrust Standard for Joint Ventures*, 35 WM. & MARY L. REV. 871, 873-74, 878-79 (1994) ("From basic industries such as automobiles and steel to high technology computer, electronic, and medical fields, American firms are forming strategic alliances with their competitors at an unprecedented rate"); Joseph Kattan, *Antitrust Considerations in Innovation-Driven Markets*, 21 CAN.-U.S. L.J. 115, 119-124 (1995) (stressing positive and negative results of research and development collaboration among competitors); Hamilton Fish, *Intellectual Property and Antitrust: Can This Marriage Be Saved?*, paper presented to Fordham Law School's Fourth Annual Conference on International Intellectual Property Law and Policy (Apr. 11-12, 1996) (discussing proposed Intel-

for *sui generis* intellectual property rights pending before the European Commission are enacted, stronger protection of industrial designs and utility models will become mandatory throughout the European Union,[23] along with existing norms that already confer strong protection on computer programs, plant varieties, databases,[24] and other borderline subject matters that fall into the penumbra between the Paris and Berne Conventions.[25] Given the cumulative effect of these and other laws, the competitive ethos characteristic of the nineteenth and early twentieth centuries may give way to a system in which virtually all products sold on the general products market come freighted with some form of exclusive property right in all countries that follow the Commission's lead.[26]

Behind these high-protectionist trends there usually lies a defensive mentality that tends to view national innovation pol-

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lectual Property Antitrust Protection Act). In the European Union, *see, e.g.*, Commission Regulation (EEC) 418/85 of 19 December 1984 on the application of Article 85(3) of the Treaty [of Rome] to categories of research and development agreements, 1985 O.J. (L 53) 5, *as amended* 1993 O.J. (L 21) 8, *reprinted in* E.C. INTELLECTUAL PROPERTY MATERIALS, *supra* note 20, at 418-26; Commission Regulation (EC) 240/96 of 31 January 1996, 1996 O.J. (L 31) 2 (on the application of Article 85(3) of the treaty of Rome to certain categories of technology transfer agreements). *See generally* Hanns Ullrich, *TRIPS: Adequate Protection, Inadequate Trade, Adequate Competition Policy* [hereinafter Ullrich, *TRIPS*], *in* ANTITRUST: A NEW INTERNATIONAL TRADE REMEDY? 153, 184-207 (John O. Haley & Hiroshi Iyori eds., 1995); Kung Wang & Jyh-Feng Ho, *Research Joint Venture, Production Joint Venture and Competition Policy, in* INTERNATIONAL HARMONIZATION OF COMPETITION LAWS 35-45 (Chia-Jui Cheng et al. eds., 1995).

23. *See, e.g.*, Dinwoodie, *supra* note 20; E.C. Green Paper on Utility Models, *supra* note 21.

24. J.H. Reichman and Pamela Samuelson, *Intellectual Property Rights in Data?*, 50 VAND. L. REV. 51 (1997).

25. *See generally* J.H. Reichman, *Legal Hybrids Between the Patent and Copyright Paradigms*, 94 COLUM. L. REV. 2432, 2453-2500 (1994) [hereinafter Reichman, *Legal Hybrids*]; *see also* Pamela Samuelson et al., *A Manifesto Concerning the Legal Protection of Computer Programs*, 94 COLUM. L. REV. 2308, 2332-65 (1994) [hereinafter Samuelson et al., *Manifesto*].

26. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2500-2511; J.H. Reichman, *Charting the Collapse of the Patent-Copyright Dichotomy: Premises for a Restructured International Intellectual Property System*, 13 CARDOZO ARTS & ENT. L.J. 475, 504-20 (1995) [hereinafter Reichman, *Collapse of the Patent-Copyright Dichotomy*]; *see also* J.H. Reichman, *Beyond the Historical Lines of Demarcation: Competition Law, Intellectual Property Rights, and International Trade After the GATT's Uruguay Round*, 20 BROOK. J. INT'L L. 75, 85-97 (1993) [hereinafter Reichman, *Competition Law, Intellectual Property and International Trade*].

icy in terms of preserving the dominant position of existing technology-exporting firms. Such policies are rooted in fears that leakage and spillovers will facilitate valuable applications of research results outside the originating countries and, ever more frequently, in newly industrialized or developing countries.[27] By combining the market power of natural competitors with strengthened international intellectual property protection,[28] oligopolists in developed countries seek to make it harder for firms in developing countries to gain access to the most valuable technologies or otherwise to catch up with the leaders in the global market for higher-tech products.[29]

This strategy could backfire in the medium or long term. One must concede that the growing dependence of modern economies on design-rich applications of know-how to industry—and especially to mass-produced information goods—has undoubtedly aggravated the problem of appropriability[30] and

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27. *See, e.g.*, Ullrich, *TRIPS*, *supra* note 22, at 186-95; Giovanni Dosi and Luc Soete, *Technological Innovation and International Competitiveness*, *in* TECHNOLOGY AND NATIONAL COMPETITIVENESS: OLIGOPOLY, TECHNOLOGICAL INNOVATION, AND INTERNATIONAL COMPETITION 91, 96-97 (Jorge Niosi ed., 1991); Paolo Bifani, *The New Mercantilism and the International Appropriation of Technology*, *in* TECHNOLOGY, TRADE POLICY, AND THE URUGUAY ROUND, U.N. Conference on Trade and Development, UNCTAD/ITP/23, 145, 156-57, 160-64 (1990); *see also* LEYDEN & LINK, *supra* note 12, at 1-2.

28. "Ironically, the national entities from whose [antitrust] regulation transnational conglomerates desire freedom are the very entities that the copyright industries seek to have protect and underwrite the legal value of their intellectual properties on both domestic and international levels." Aoki, *supra* note 14, at 1347.

29. *See, e.g.*, Luc Soete, *Opportunities for and Limitations to Technological Leapfrogging*, *in* TECHNOLOGY, TRADE POLICY, AND THE URUGUAY ROUND, U.N. Conference on Trade and Development, UNCTAD/ITP/23, 3 (1990); *see also* Luigi Orsenigo, *The Dynamics of Competition in a Science-Based Technology: The Case of Biotechnology*, *in* TECHNOLOGY AND THE WEALTH OF NATIONS 41 (D. Foray & C. Freeman eds., 1993); Bernard Bonin, *Oligopoly, Innovation, and Firm Competitiveness*, *in* TECHNOLOGY AND NATIONAL COMPETITIVENESS: OLIGOPOLY, TECHNOLOGICAL INNOVATION, AND INTERNATIONAL COMPETITION 267-81 (J. Niosi ed., 1991). However, the efficient production of cutting-edge technologies may sometimes justify a mix of cooperative and competitive strategies that deviates from classical economic models. *See, e.g.*, Cristiano Antonelli, *The Economic Theory of Information Networks*, *in* THE ECONOMICS OF INFORMATION NETWORKS 5, 6-10 (C. Antonelli ed., 1992).

30. *See, e.g.*, WILLIAM KINGSTON, INNOVATION, CREATIVITY AND LAW 83 (1990) ("Decisions *not* to invest in the generation of new information because of inability to reap the rewards are . . . wholly rational . . . [and] an informational commons . . . could only result in *there being no information*

created new problems of network externalities.[31] Nevertheless, reliance on a mindless proliferation of exclusive property rights represents an overprotective response that could prove socially more harmful than the underlying threat of market failure.[32] Technical information never exists in a vacuum: "[t]hose who innovate cannot avoid (involuntarily) sharing profits with others."[33] The dynamism of a competitive economic system depends on leakage, spillovers, cross-germination of skills and ideas, and on the improvements that flow from reverse-engineering.[34] When over-protection is substituted for under-protection, the legal barriers to entry and other anti-competitive conditions that result tend to suffocate the small and medium-sized firms whose incremental innovations are often the real engines of domestic economic growth.[35]

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worth using"); Reichman, *Legal Hybrids*, *supra* note 25, at 2506-19; Samuelson et al., *Manifesto*, *supra* note 25, at 2320-42. *See also* Wendy J. Gordon, *On Owning Information: Intellectual Property and the Restitutionary Impulse*, 78 VA. L. REV. 149, 223-24, 230-38 (1992) (proposing tort of malcompetitive copying for information products); Rochelle C. Dreyfuss, *Information Products: A Challenge to Intellectual Property Theory*, 20 N.Y.U. J. INT'L L. & POL. 897, 908-12 (1988); Ejan MacKaay, *Economic Incentives in Markets for Information and Innovation*, 13 HARV. J. L. & PUB. POL'Y 867, 901-03, 906-09 (1990).

31. *See, e.g.*, Antonelli, *supra* note 29, at 15-25; *infra* text accompanying notes 162-163 (explaining lack of consensus on the appropriate mesh between intellectual property and antitrust laws because overuse of the latter can impede contractual relations and distort incentives to invest); *see also* Peter S. Menell, *An Analysis of the Scope of Copyright Protection for Applications Programs*, 41 STAN. L. REV. 1045 (1989).

32. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2527-2533; Reichman, *Collapse of the Patent-Copyright Dichotomy*, *supra* note 26, at 512-20 ("The Competitive Ethos Under Attack"); Samuelson et al., *Manifesto*, *supra* note 25, at 2356-64 (discussing cycles of under- and over-protection).

33. P. Cohendet et. al., *Technological Learning, Economic Networks and Innovation Appropriability*, *in* TECHNOLOGY AND THE WEALTH OF NATIONS 66 (D. Foray & C. Freeman eds., 1993). *See also* Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, 1987 BROOKINGS PAPERS ON ECONOMIC ACTIVITY 783, 784.

34. *See supra* notes 26-30; *infra* text accompanying notes 182-196.

35. *See, e.g.*, GIOVANNI DOSI ET AL., THE ECONOMICS OF TECHNICAL CHANGE AND INTERNATIONAL TRADE 82-89 (1990) [hereinafter DOSI ET AL.] (discussing "technological paradigms and trajectories" and stressing "technology-specific and country-specific aspects of opportunity, cumulativeness and appropriability of technological advances"); RICHARD NELSON & S. WINTER, AN EVOLUTIONARY THEORY OF ECONOMIC CHANGE 255-72 (1982) (stressing cumulative and sequential nature of modern innovation); *see gener-*

The high-protectionist policies currently favored by policymakers in many developed countries err by taking existing levels of innovative strength for granted. Of course, if there were no intellectual property systems to provide any regulated equilibrium between creators and imitators, the risk of sub-optimal investment in technological innovation could become unacceptably high, owing to the "public goods" character of intellectual creations.[36] When, however, the regulatory balance tips too far in favor of innovators at the expense of users and competitors, it tends to misallocate the scarce resources devoted to research and development and to reduce the efficiencies that flow from reverse-engineering and from cumulative, sequential innovation generally.[37] The legal barriers to entry that result from overly protectionist measures may also weaken the overall competitiveness of national innovation systems with respect to other systems that permit entrepreneurs to operate in less protectionist environments.[38]

In the developing countries and countries in transition, meanwhile, the persistence of entrenched market-distorting factors seems likely to diminish the social benefits that should otherwise flow from the reduction of trade barriers in the Uruguay Round. The developing countries in general and the Least-Developed Countries [LDCs] in particular suffer from inadequate investment trends, insufficient development of human resources and the lack of adequate technological ca-

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ally Bonin, *supra* note 29, at 273-76 ("oligopoly, firm size, and innovation"). *Cf.* Orsenigo, *supra* note 29, at 62 (stressing relativism of past efficiencies and concluding that "variety in the patterns of innovation and of organization of innovative activities is likely to be a permanent feature and a necessary outcome of technological change").

36. *See supra* note 2; Wendy J. Gordon, *Asymmetric Market Failure and Prisoner's Dilemma in Intellectual Property*, 17 U. DAYTON L. REV. 853, 854-59 (1992).

37. *See supra* note 35; *see also* John H. Barton, *Adapting the Intellectual Property System to New Technologies*, *in* GLOBAL DIMENSIONS OF INTELLECTUAL PROPERTY RIGHTS IN SCIENCE AND TECHNOLOGY 256, 271-283 (Mitchel B. Wallerstein et al. eds., 1993) (approving *sui generis* legal means to overcome market failure, but expressing concern about formation of mini-monopolies that undermine crucial role of small firms in innovation); Glynn S. Lunney, Jr., *Reexamining Copyright's Incentives—Access Paradigm*, 49 VAND. L. REV. 483, 520-21, 655-56 (1996).

38. *Cf.* Reichman, *Gatt Connection*, *supra* note 3, at 844-48 (evaluating economic effects of national treatment rule in checking unilateral moves to restrict or expand the level of protection under Paris Convention).

pacity.[39] Against this background, developing countries and countries in transition are striving to rationalize their national systems of innovation, to maximize their ability to acquire and absorb scientific and technical knowledge, and to improve their competitive capabilities in the emerging global marketplace, notwithstanding the legal and nonlegal barriers elsewhere devised to frustrate this objective. In so doing, adherence to the TRIPS Agreement requires these same countries to reconcile their own economic development goals with its international intellectual property norms.[40]

So long as the technically advanced countries continue to weaken their commitment to free competition by encasing incremental innovation in ever thicker layers of legal protection, the logical course of action for the developing countries in implementing their obligations under the TRIPS Agreement is to shoulder the pro-competitive mantle that the developed countries have increasingly abandoned. On the integrated world market that the WTO Agreement seeks to establish, the defense of the public interest in free competition could thus fall by default to the less advanced countries and to countries in transition. In effect, decision-makers in these latter countries now speak for the pro-competitive forces within the developed countries that have temporarily lost their ability to influence the direction of public policy.[41] In taking over the pro-competitive position within orthodox intellectual property discourse, the developing countries can help to promote consumer welfare even in those developed countries where the interests of both consumers and small or medium-sized innovators are increasingly held hostage to the political influence of oligopolistic combinations that use intellectual property rights to expand market power.

It follows that the developing countries should seek to maintain the maximum amount of competition in their do-

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39. *See, e.g.*, Soete, *supra* note 29.

40. *See* TRIPS Agreement, *supra* note 1, art. 7 ("The protection . . . of intellectual property . . . should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.") *See also* Reichman, *TRIPS and Developing Countries*, *supra* note 8, at 1-3, 44-45.

41. *See also* Reichman, *Compliance with TRIPS*, *supra* note 6, at 388-90.

mestic markets that is consistent with a good faith implementation of the international minimum standards of intellectual property protection. In carrying out this task, they will find much room to maneuver from within the international conventions themselves, which leave wide and crucial issues, especially scope of protection issues, to the vagaries of the WTO Member States' domestic laws.[42] In other words, the wholesale elevation of minimum standards under the TRIPS Agreement cannot obscure the extent to which the "grey" or ill-defined areas of national intellectual property laws persist in an unharmonized state under the existing international conventions.[43] How single states mesh these "grey areas" with the express norms embodied in the TRIPS Agreement will initially determine the level of competition in single markets and will eventually determine the regulatory balance for the global market as a whole.

III. A PRO-COMPETITIVE STRATEGY FOR IMPLEMENTING THE TRIPS AGREEMENT

A pro-competitive strategy for implementing the TRIPS Agreement in developing countries (as distinct from LDCs, which are relegated to a slower track),[44] consists of at least five component factors. First, the developing countries may tilt their domestic patent, copyright and related intellectual property laws to favor second-comers, especially local competitors, rather than distant proprietary rights holders, to the full extent that good faith compliance with both national treatment and the relevant TRIPS standards still permits.[45] Second, and

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42. *See, e.g.*, Ullrich, *TRIPS*, *supra* note 22, at 194 (stating that "TRIPS is not aimed at trade as such, but at trade based on a certain form of competition, namely, competition for innovation," with the same "frame of reference . . . as that of intellectual property protection under national law"); *see also* Ullrich, *TRIPS*, *supra* note 22, at 208 (stating that, as regards its operation, "TRIPS . . . may of course be read defensively or pro-competitively").

43. *See infra* text accompanying notes 50-153 (identifying and discussing many of these "grey" areas).

44. *See supra* note 7 and accompanying text (transition periods for developing and least-developed countries).

45. *See infra* text accompanying notes 58-155; TRIPS Agreement, *supra* note 1, arts. 7 (*quoted supra* note 40), 8 (allowing members to "adopt measures necessary . . . to promote the public interest in sectors of vital importance to their socio-economic and technological development . . . [if] consistent with the provisions of this Agreement").

closely related, the developing countries should distance themselves from protectionist measures being adopted in the developed countries, and they may use tailor-made applications of competition law to curb the adverse effects of these measures on their domestic economies and to limit the abusive exercise of market power in general.[46] Third, developing countries may institute incentive structures likely to stimulate subpatentable innovation at the local level with fewer anticompetitive effects than the hybrid regimes of exclusive property rights proliferating in the developed countries.[47] Fourth, the developing countries may resist any further elevation of international intellectual property standards beyond the levels set in the TRIPS Agreement unless they are offered countervailing trade concessions or until their own technological prowess justifies the social costs of such regimes.[48] Fifth, the developing countries may exploit new means of acquiring and disseminating scientific and technical knowledge by resorting to the global information infrastructure, and they should potentiate both their physical capacity to access such knowledge and the intellectual skills to process the information conveyed.[49] These components are discussed below.

A. *Accommodating Established Intellectual Property Regimes to National Development Goals*

To appreciate the range of opportunities available to developing countries that seek to implement the required international minimum standards with a pro-competitive bias, one must realize "that both the strengths and weaknesses of the TRIPS Agreement stem from its essentially backwards looking character."[50] As I have elsewhere pointed out, its strengths lie in the adoption of time-tested norms that most developed legal systems had already recognized in their domestic laws and that were sometimes already embodied in existing international conventions. Its principal weakness stems from the

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46. *See infra* text accompanying notes 156-180.

47. *See infra* text accompanying notes 181-249.

48. *See infra* text accompanying notes 249-260.

49. *See infra* text accompanying notes 260-291.

50. J.H. Reichman, *The Know-How Gap in the TRIPS Agreement: Why Software Fared Badly, and What are the Solutions*, 17 HASTINGS COMM. & ENT. L.J. 763, 765-66 (1995) [hereinafter Reichman, *Know-How Gap in TRIPS*].

drafters' inclination "to stuff . . . new technologies into the overworked and increasingly obsolete patent and copyright paradigms," which simply ignored "the systemic contradictions and economic disutilities this same approach was already generating in the domestic intellectual property systems."[51]

Even with regard to traditional objects of intellectual property protection, notably patentable inventions and copyrightable literary and artistic works,[52] the TRIPS Agreement leaves developing countries ample "wiggle room" in which to implement national policies favoring the public interest in free competition. In these "grey areas" of world intellectual property law, the heaviest constraints on national policy-making stem less from the weight of international minimum standards as such than from such ancillary policy goals as the encouragement of direct foreign investment, transfers of tech-

51. *Id.*, at 766. *See also* Hamilton, *supra* note 15, at 620-33.

52. *See* TRIPS Agreement, *supra* note 1, arts. 9-14, 27-34. The trademark and unfair competition provisions of the TRIPS Agreement, which build on detailed provisions in the Paris Convention, arguably work to the advantage of developing countries because healthy competition presupposes informed consumer choice. The deception of either local or foreign consumers retards long-term national development and distorts competition in the global marketplace. *See* TRIPS Agreement, *supra* note 1, arts. 15-24; Paris Convention, *supra* note 10, art. 10*bis*; Paul Heald, *Impact of the TRIPS Agreement on Specific Disciplines: Trademarks and Geographical Indications: Exploring the Contours of the TRIPS Agreement*, 29 VAND. J. TRANSNAT'L L. 635, 655-56 (1996). To alleviate the displacement costs of curbing industries founded on the production or importation of counterfeit goods, as the TRIPS Agreement requires, "developing countries need to convert affected industries to the production of clearly marked, substitute goods that establish their own market niche by means of price competition with more costly foreign goods." Reichman, *Intellectual Property and the GATT*, *supra* note 8, at 41. Stronger trademark regimes in developing countries may also encourage direct investment and licensing by foreign producers who need to monitor quality and maintain goodwill in the international market generally. *See, e.g.*, Richard P. Rozek, *Protection of Intellectual Property Through Licensing: Efficiency Considerations*, 22 J. WORLD TRADE L. 27, 28-30 (Oct. 1988). However, to the extent that trademarks in developed countries influence consumer preferences in ways that do not merely designate source of origin, and these trade values are secured by the relevant TRIPS standards, so use of these standards may arguably give rise to a misallocation of resources. *See, e.g.*, Annette Kur, *TRIPS and Trademark Law*, *in* FROM GATT TO TRIPS—THE AGREEMENT ON TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS 93, 110-13, 115-16 (F.K. Beier & G. Schricker eds., 1996) [hereinafter FROM GATT TO TRIPS]. These topics are not further considered in this Article.

nology, and the stimulation of local innovation.[53] Given the strong requirements of national treatment under the TRIPS Agreement,[54] in other words, states must avoid pinching their own innovators' toes when limiting the protection afforded foreign rights holders.

Another serious constraint on intellectual property policymaking in the developing countries is the high cost of training skilled personnel and of maintaining the autonomous administrative capabilities to implement refined legal doctrine on a case-by-case approach. To some extent, states can defray these costs from taxes and fees on intellectual property transactions, and they may receive technical assistance under the TRIPS Agreement itself.[55] States should, however, resist the temptation to treat intellectual property services as a "cash cow," which leads to the rubber-stamping of foreign applications in the various fields of protection.[56]

1. *Patentable Inventions*

The sweeping provisions of the TRIPS Agreement with respect to objects of protection, eligibility criteria, duration, and exclusive rights prevent developing countries from excluding entire industries from the benefits of the patent monopoly or from exposing entire categories of foreign inventors to free-riding local imitators.[57] By the same token, these standards

53. *See, e.g.*, Edwin Mansfield, *Unauthorized Use of Intellectual Property: Effects on Investment, Technology Transfer, and Innovation*, *in* GLOBAL DIMENSIONS OF INTELLECTUAL PROPERTY RIGHTS IN SCIENCE AND TECHNOLOGY 107, 110-19 (Mitchel B. Wallerstein et al. eds., 1993); Keith E. Maskus & Denise Eby Konan, *Trade-Related Intellectual Property Rights: Issues and Exploratory Results*, *in* ANALYTICAL AND NEGOTIATING ISSUES IN THE GLOBAL TRADING SYSTEM 401, 409-16, 439-40 (Alan V. Deardorff & Robert M. Stern eds., 1994); Carlos M. Correa, *Trends in Technology Transfer: Implications for Developing Countries*, 21 SCI. & PUB. POL'Y 369 (1994) (U.K.).

54. *See* TRIPS Agreement, *supra* note 1, arts. 3 (national treatment), 4 (MFN treatment); *see also id.*, arts. 65-66 (requiring both developing countries and LDCs to implement Articles 3-4 one year after WTO Agreement takes effect).

55. *See* TRIPS Agreement, *supra* note 1, art. 67; Otten and Wager, *supra* note 6, at 410 (stressing importance of technical assistance); Oddi, *TRIPS*, *supra* note 14, at 461-62.

56. Interview with Dr. Carlos Primo Braga, World Bank official, March 2, 1996.

57. *See, e.g.*, Joseph Straus, *Implications of the TRIPS Agreement in the Field of Patent Law*, *in* FROM GATT TO TRIPS—THE AGREEMENT ON TRADE-RELATED

allow the patent authorities responsible for implementing the domestic laws to subject each individual applicant to strict limitations on eligibility and scope of protection.[58]

a. *Traditional Objects of Protection*

For example, there is no agreed international standard of absolute novelty, and, within limits, the developing countries may pick and choose from among the different approaches recognized in the domestic patent laws.[59] In principle, developing countries may allow oral prior art to defeat novelty, and they may not wish to provide any novelty grace period (in keeping with the current majority rule) because this tends to enlarge the field of inventions patented in developed countries that will remain available for local exploitation without payment of royalties.[60] The developing countries may also want to preserve the rights of prior users of a subsequently patented invention to continue their use of that invention in their own enterprises.[61]

Similarly, there is no international agreement or uniform set of guidelines for implementing the now universal eligibility criterion of "nonobviousness."[62] The patent authorities in some developing countries may, therefore, insist that historically high standards of nonobviousness apply under their domestic patent laws, in order to preserve ample scope for free

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ASPECTS OF INTELLECTUAL PROPERTY RIGHTS 160, 180-208 (F.K. Beier & G. Schricker eds., 1996).

58. *See* TRIPS Agreement, *supra* note 1, arts. 27-34; Reichman, *Universal Minimum Standards*, *supra* note 6, at 351-58.

59. *See, e.g.*, Straus, *supra* note 57, at 195-96 (stressing minimum consensus on these issues); Harold C. Wegner, *TRIPS Boomerang—Obligations for Domestic Reform*, 29 VAND. J. TRANSNAT'L L. 535, 548-58 (1996) (discussing tensions between U.S. patent law and TRIPS Agreement); *see generally* WEGNER, supra note 20, at 75-128.

60. *Cf.* WEGNER, *supra* note 20, at 78-82, 88-97 (discussing novelty criteria in comparative law).

61. *See, e.g.*, WEGNER, *supra* note 20, at 115-28 (citing authorities).

62. *See* TRIPS Agreement, *supra* note 1, art. 27(1) and note 5 (equating "inventive step" and "capable of industrial application" with "nonobvious" and "useful"). At least one leading commentator believes that the issue of nonobviousness will defy harmonization efforts for the foreseeable future. *See* WEGNER, *supra* note 20, at 82-84.

competition with respect to routine discoveries.[63] To this same end, local authorities are entitled to exercise all of the claims limitations practiced abroad and to know the results of prior invalidation proceedings at the administrative or judicial levels.[64] A national opposition system seems uniformly advisable.[65]

However, because foreign and national patentees must obtain equal treatment, other developing countries may prefer lower standards of nonobviousness than those prevailing in developed countries in order to stimulate greater use of the patent system by local innovators.[66] Still another option is to keep the eligibility requirements for patent protection relatively high, while providing non-patent incentives of particular interest to local innovators, as discussed below.[67] Most of these non-patent incentives fall outside the minimum standards of the TRIPS Agreement (though not necessarily outside

63. *Accord* Oddi, *TRIPS*, *supra* note 14, at 464-65 (stating that a "high standard of patentability should be adopted to ensure that mere detail patents of the type that tend to be market-induced rather than truly revolutionary or basic inventions are not granted"). Prof. Oddi adds that the test should be "whether the claimed invention would be nonobvious to a person skilled in that art *anywhere in the world*." *Id.*, at 465. *But see* Straus, *supra* note 57, at 196 (arguing that precedents requiring "an advance in the art" may be overruled by reference to the "inventive step" test used in the European Union). Query whether U.S. negotiators had the authority to deviate from the U.S. nonobviousness standard, which does require an advance in the art beyond the reach of the routine engineer.

64. *See* TRIPS Agreement, *supra* note 1, art. 29(2) (allowing administrators to require a prospective patentee to provide information concerning his or her corresponding foreign applications and grants); *see also* Paris Convention, *supra* note 10, art. 4*bis* (rendering each nation's patent-granting process independent of similar processes elsewhere); Straus, *supra* note 57, at 197 (stressing need to facilitate work of patent offices in developing countries).

65. *See, e.g.*, WEGNER, *supra* note 20, at 84; *see also* Toshiko Takenaka, *The Role of The Japanese Patent System in Japanese Industry*, 13 UCLA PAC. BASIN L.J. 25, 28-29 (1994) (stating that 7-8% of all published European and Japanese applications and 35% of the more important patents "are struck down by opposition, and another 35% are amended to narrower claims to avoid the prior art found by opponents"). Dr. Takenaka estimates that some "70% of significant American patents, or 5% of the total number of issued American patents, may be overbroad and prevent competitors from using technology which rightfully should be in the public domain." *Id.*, at 29. *See also* Oddi, *TRIPS*, *supra* note 14, at 464-65.

66. *See, e.g.*, Gana, *supra* note 8, at 750-51 (advocating this approach).

67. *See infra* text accompanying notes 206-249

the residual national treatment clauses of the Paris and Berne Conventions);[68] some may be novel enough as to allow the legislating state to impose a condition of material reciprocity on foreign nationals.[69]

In the past, leading developed countries tightened or relaxed the standards of nonobviousness at different periods in response to domestic economic pressures.[70] Some developing countries may, therefore, wish to organize boards of internationally recognized experts who could assist them in distinguishing between pioneering or breakthrough inventions clearly eligible for patent protection and merely incremental or routine innovations that may be excluded under traditional standards, even if one or more developed countries might have lowered their patent standards to accommodate the same innovation. The developing countries should also welcome the opportunity to defend these principled standards of nonobviousness before impartial international tribunals established under the dispute-resolution machinery of the TRIPS Agreement.[71] It is precisely from a reasoned analysis of the tensions between legal incentives to create and the public interest in free competition as posed in single cases subject to

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68. *See* TRIPS Agreement, *supra* note 1, arts. 2(1), 3, 9(1); Paris Convention, *supra* note 10, arts. 1(2), 2(1); Berne Convention, *supra* note 10, art. 5(1).

69. *See, e.g.*, E.C. Directive on Databases, *supra* note 21, art. 11 (imposing material reciprocity); *infra* text accompanying notes 228-249 (discussing proposed *sui generis* regimes for subpatentable innovation built on modified liability principles).

70. *See, e.g.*, DONALD S. CHISUM, PATENTS: A TREATISE ON THE LAW OF PATENTABILITY, VALIDITY AND INFRINGEMENT sec. 5.02[3] (1978 & Supp. 1996) (discussing past hostility of U.S. courts to patent owners, which resulted in very high rate of invalidation); Martin J. Adelman, *The New World of Patents Created by the Court of Appeals for the Federal Circuit*, 20 U. MICH. J.L. REFORM 979 (1987); *see also* Takenaka, *supra* note 65, at 30 (discussing trend toward stronger enforcement of patents in Japan).

71. *See* TRIPS Agreement, *supra* note 1, arts. 64, 68-69; WTO Agreement, *supra* note 1, Annex 2, Understanding on Rules and Procedures Governing the Settlement of Disputes. *See also* Rochelle C. Dreyfuss and Andreas F. Lowenfeld, *Two Achievements of the Uruguay Round: Putting TRIPS and Dispute Settlement Together*, 37 U. VA. J. INT'L L. __ (forthcoming 1997); Paul Edward Geller, *Intellectual Property in the Global Marketplace: Impact of TRIPS Dispute Settlement?*, 29 INT'L LAW. 99, 107-14 (1995) (arguing that WTO panels should fill gaps in international intellectual property law); Michael K. Young, *Dispute Resolution in the Uruguay Round: Lawyers Triumph Over Diplomats*, 29 INT'L LAW. 389 (1995).

international adjudication that a truly worldwide standard of nonobviousness may emerge in the form of customary international law.

The international patent system continues to mandate full disclosure of the nature of patentable inventions, including an explanation of the best mode for practicing an invention that was known to the inventor at the time of filing.[72] Developing countries could strictly implement these standards, with a view to enabling third parties to invent around the claimed inventions, or to adapt them to local conditions, or merely to practice them once the term of protection expires.[73] These countries should also insist that all patent applications be published at least eighteen months after filing, whether or not patents are issued in the end, and they should encourage local firms to make systematic use of the technical information thus revealed to develop new products and improved manufacturing methods of their own.[74]

As regards the scope of patent protection, no agreed international minimum standards currently regulate claims interpretation or the doctrine of equivalents, and state practice varies widely in these matters.[75] In general, the developing countries may opt for strict construction of claims and a nar-

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72. *See TRIPS Agreement*, *supra* note 1, art. 29(1); *see also* WEGNER, *supra* note 20, at 151-67 (noting U.S. proposals to eliminate this requirement).

73. *See TRIPS Agreement*, *supra* note 1, art. 33 (mandating minimum term of twenty years from the date of filing); Oddi, *TRIPS*, *supra* note 14, at 463 ("developing countries should insist upon a complete disclosure"); *see also* Takenaka, *supra* note 65, at 27-28 (importance of "inventing around" for Japanese industry).

74. *See, e.g.*, WEGNER, *supra* note 20, at 259-68 (noting U.S. move to conform to emerging standard practice of publication eighteen months after filing); Takenaka, *supra* note 65, at 26-28 (stressing aggressive use of such information by Japanese companies to reduce research and development costs and to improve their own published inventions).

75. *See generally* TOSHIKO TAKENAKA, INTERPRETING PATENT CLAIMS: THE UNITED STATES, GERMANY, AND JAPAN 287-310 (1995); Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839 (1990). For recent uncertainties in the United States, *see, e.g.*, *Markman v. Westview Instruments, Inc.*, 116 S. Ct. 1384 (1996); *Hilton Davis Chemical Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512 (Fed. Cir. 1995), *cert. granted*, 116 S. Ct. 1014 (1996); Robert J. Goldman & Douglas A. Cardwell, Markman *and* Hilton Davis: *An Analysis*, paper presented to Fordham Law School's Fourth Annual Conference on International Intellectual Property Law and Policy (Apr. 11-12, 1996).

row doctrine of equivalents so as to expand the field available for local entrepreneurs to work around or adapt foreign inventions.[76]

Although Article 30 of the TRIPS Agreement attempts to limit the exceptions that WTO member countries may make to a patentee's specified exclusive rights,[77] developing countries may defend those "extremely manipulable requirements for exceptions" that survive in state practice.[78] For example, one exemption, recognized by Article 27(1) of the Community Patent Convention [CPC] allows individuals to engage in private, noncommercial use of patented technology for certain limited purposes.[79] Another, closely related exemption also recognized by Article 27 of the CPC permits use of the patented invention for experimental purposes. This exemption is meant to encourage innovation and research and to create additional sources of technical information of benefit to the public at large.[80] In this context, developing countries could legitimate experiments tending to facilitate "designing around" the patented invention in order to ascertain non-infringing modes of accomplishing comparable results.

Among other measures that have been recommended, strict regulatory provisions in various fields, such as pharmaceutical patents, merit attention, as do proposals for imposing

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76. *Accord* Oddi, *TRIPS*, *supra* note 14, at 464; *see also* Takenaka, *supra* note 65, at 27-31 (stating that efforts to "'invent around' and 'surround. . .by improvements'. . . [are] a significant reason for the miraculous development of Japanese industry"); Dan Rosen and Chikako Usui, *The Social Structure of Japanese Intellectual Property Law*, 13 UCLA PAC. BASIN L.J. 32 (1994).

77. *See* TRIPS Agreement, *supra* note 1, arts. 28, 30-32. *See also* WEGNER, *supra* note 20, at 248-58.

78. Straus, *supra* note 57, at 203 (stressing flexible guidelines of Article 30 as a compromise solution).

79. *See* Convention for the European Patent for the Common Market (the Community Patent Convention) and 1989 Luxembourg Agreement relating thereto, 1989 O.J. (L 401) 1, together with Protocol on Litigation, art. 27, *reprinted in* SWEET & MAXWELL'S E. C. INTELLECTUAL PROPERTY MATERIALS 50-95 (Anna Boody & Audrey Horton eds., 1994) (not yet entered into force) [hereinafter CPC]); *see also* WEGNER, *supra* note 20, at 257; Straus, *supra* note 57, at 203-04.

80. *See* CPC, *supra* note 79, art. 27; *see also* AMIRAM BENYAMINI, PATENT INFRINGEMENT IN THE EUROPEAN COMMUNITY 254-280 (1993); DAVID GILAT, EXPERIMENTAL USE AND PATENTS 51-65 (1995); Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017 (1989).

diverse administrative fees.[81] Developing countries may also invoke safeguard provisions implicit in the objectives set out in Article 7 of the TRIPS Agreement as well as the public interest exceptions expressly recognized in Article 8. Under the appropriate circumstances, these provisions may legitimize ad hoc exceptions and limitations required by overriding national development needs or for reasons of national health, welfare or security; and compulsory licenses remain available for these and other purposes on specified conditions.[82]

Ancillary measures sounding in competition law and related doctrines of misuse of patents may also play a critical role in the developing countries' overall strategy. This topic is discussed below.[83]

b. *New Technologies*

There is no international consensus governing the patenting of certain new technologies that fit imperfectly within the classical patent and copyright paradigms,[84] especially advances in biogenetic engineering and computer science. Developing countries thus have strong legal grounds for emulating the more restrictive practices of the intellectual property authorities in those developed countries that have addressed these issues. In so doing, however, they should avoid undermining incentives to invest in local research and development, given that the TRIPS Agreement expressly forbids discrimination against foreign rights-holders,[85] and they will want to avoid unduly discouraging the transfer of foreign technology.

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81. *See, e.g.*, Oddi, *TRIPS*, *supra* note 14, at 461-62, 465, 467; *but see supra* text accompanying note 56 (quoting Dr. Carlos Primo Braga of the World Bank as cautioning against the temptation to treat intellectual property services as a "cash cow").

82. *See* TRIPS Agreement, *supra* note 1, arts. 7 (*quoted supra* note 40), 8 (*quoted supra* note 45), 31; Straus, *supra* note 57, at 203-07; Ana Maria Pacón, *What Will TRIPS Do for Developing Countries?*, *in* FROM GATT TO TRIPS—THE AGREEMENT ON TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS 329, 339-41 (F.K. Beier & G. Schricker eds., 1996); *see also* Reichman, *TRIPS and Developing Countries*, *supra* note 8, at 14-18 ("Safeguards and Escape Hatches").

83. *See infra* text accompanying notes 165-180.

84. *See, e.g.*, Straus, *supra* note 57, at 183-88; *see also* Reichman, *Collapse of the Patent-Copyright Dichotomy*, *supra* note 26, at 496-512; Reichman, *Legal Hybrids*, *supra* note 25, at 2442-44, 2453-2520.

85. *See supra* note 54.

(i) *Biotechnology*

The patenting of genetically engineered products has grown more controversial over time both with respect to the technical issues of patent law as such[86] and, more recently, with respect to ethical and moral issues that, for example, caused the European Parliament to reject the proposed E.C. Directive on the Legal Protection of Biotechnological Inventions.[87] This uncertainty, already evident in the relevant TRIPS provisions,[88] makes it unlikely that states could use the WTO framework to oblige other states to adopt high levels of

86. *See, e.g.*, Rainer Moufang, *Problems Related to the Protection of New Technologies: Biotechnical Inventions, in* EUROPEAN RESEARCH STRUCTURES—CHANGES AND CHALLENGES 178-88 (Max Planck-Gesellschaft ed., 1994); Joseph Straus, *Patenting Human Genes in Europe - Past Developments and Prospects for the Future*, 26 INT'L REV. OF INDUS. PROP. AND COPYRIGHT L. 920 (1995) [hereinafter Straus, *Patenting Genes*]; Rebecca S. Eisenberg & Robert P. Merges, *Opinion Letter as to the Patentability of Certain Inventions Associated with the Identification of Partial cDNA Sequences*, 23 AIPLA Q.J. 1 (1995). *See also* Yusing Ko, *An Economic Analysis of Biotechnology Patent Protection*, 102 YALE L.J. 777, 777-79 (1992); John Richards, *International Aspects of Patent Protection for Biotechnology*, 4 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 433 (1993); Dan L. Burk, *Biotechnology and Patent Law: Fitting Innovation to the Procrustean Bed*, 17 RUTGERS COMPUTER & TECH. L.J. 1, 24-71 (1991).

87. *See* Proposed E.C. Directive on the Legal Protection of Biotechnological Inventions, *supra* note 20; Straus, *Patenting Genes*, *supra* note 86, at 921-22; *see also* R. Stephen Crespi, *The E.C. Directive on Biotechnological Inventions, in* PROTECTING AND EXPLOITING BIOTECHNOLOGICAL INVENTIONS 69, 69-77 (Rosa Greaves ed., 1991).

88. *See* TRIPS Agreement, *supra* note 1, art. 27(3)(b), requiring patent protection for microorganisms and for "nonbiological and microbiological processes," but not for higher organisms, whether plant or animal, nor for "essentially biological processes for the production of plants or animals;" *id.*, art. 27(2) (allowing subject-matter exclusions "to protect *ordre public* or morality, including [the need to protect] human, animal, or plant life or health or to avoid serious prejudice to the environment" provided that local law is not exclusively relied on for the prohibition. *Cf.* Convention on the Grant of European Patents [EPC] art. 53(b), *opened for signature* Oct. 5, 1973, 13 I.L.M. 270; Moufang, *supra* note 86, at 180-85 (favoring narrow construction); Richard E. Bizley, *Patent Claims for Plants and Animals Under the European Patent Convention, in* PROTECTING AND EXPLOITING BIOTECHNOLOGICAL INVENTIONS 11, 11-22 (Rosa Greaves ed., 1991). United States practice does not recognize most of these subject-matter distinctions and, accordingly, allows broad patentability for biotechnological inventions, at least as a subject-matter issue. *See, e.g., Diamond v. Chakrabarty*, 447 U.S. 303 (1980); 1 IVER P. COOPER, BIOTECHNOLOGY AND THE LAW ch. 6 (1996).

patent protection for this class of inventions for the foreseeable future.

Nevertheless, the relevant TRIPS provisions do not altogether lack teeth, and, at least in principle, do require developing countries to recognize patent protection for micro-organisms and for non-biological and microbiological processes.[89] States adopting a restrictive policy toward biotechnological inventions must, therefore, take pains to employ a variety of legal tools on a case-by-case approach without relying uncritically on any single tool in the abstract. For example, subject matter restrictions invoked on ethical or moral grounds could elicit close scrutiny from the Council for TRIPS;[90] they could also require the states in question not to import related medicinal products.[91] In the case of genetically altered plants, states opting out of patent protection will usually have to provide breeders with some form of *sui generis* protection, as discussed below.[92]

Similarly, states may limit the availability of patents for biotechnological inventions by insisting on strict standards of novelty, utility, nonobviousness, and disclosure,[93] provided that the administrative or judicial applications of these standards were carefully reasoned, were not based on arbitrary or capricious value judgments, and were uniformly applied to nationals and foreigners alike.[94] The extent to which states must accept the deposit of microorganisms and other biological ma-

89. *Cf., e.g.*, Pacón, *supra* note 82, at 343.

90. *See* TRIPS Agreement, *supra* note 1, arts. 64, 68; Reichman, *Universal Minimum Standards, supra* note 6, at 382-85; Bizley, *supra* note 88, at 15-17.

91. *See, e.g.*, Straus, *Patenting Genes, supra* note 86, at 925-35, 948-50; Carlos Correa, *The GATT Agreement on Trade-Related Aspects of Intellectual Property Rights: New Standards for Patent Protection*, 16 EUR. INTELL. PROP. REV. 327, 328 (1994).

92. *See* TRIPS Agreement, *supra* note 1, art. 27(3)(b); International Convention for the Protection of New Varieties of Plants of Dec. 2, 1961, *as last revised* on Mar. 19, 1991, *reprinted in* 3 EUR. PAT. HANDBOOK (MB) ch. 90 [hereinafter UPOV 1991]; Straus, *supra* note 57, at 185-86. *See also* Reichman, *Legal Hybrids, supra* note 25, at 2465-72 (citing authorities); *infra* text accompanying notes 206-223, 244-244 (discussing plant breeders' rights in connection with other *sui generis* laws to stimulate local innovation).

93. *See, e.g.*, Moufang, *supra* note 86, at 183-85; Straus, *Patenting Genes, supra* note 86, at 935-42; Eisenberg & Merges, *supra* note 86.

94. *See, e.g.*, TRIPS Agreement, *supra* note 1, arts. 3-4, 41-43, 49; *supra* note 7.

terial as supplementary methods of fulfilling the disclosure and best mode requirements is open to question, and the regulation of such deposit requirements is clearly left to the domestic laws.[95] Even when biogenetic patents issue, courts and administrators may legitimately afford a narrow scope of protection, despite tendencies to honor broad claims in some developed countries.[96]

Policymakers need to weigh the consequences of such a strategy against the overall objectives of a given state's national innovation system, however. While limiting patent protection of biogenetically engineered products allows local industry much greater scope for reverse-engineering by honest means (which should always be legal under the TRIPS Agreement[97]), it discourages authorized foreign transfers of the relevant technology, and it may also skew the kind of investments that local firms are willing to make in these same technological pursuits.[98] In some cases, different policies at different times will

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95. *See, e.g.*, Straus, *supra* note 57, at 196-97 (who infers that such deposits are mandatory under art. 27(3)(b) and who hopes that states will adhere to the Budapest Treaty on International Recognition of the Deposit of Microorganisms for the Purpose of Patent Procedure of 1977).

96. *See* Moufang, *supra* note 86, at 185-86; R. Stephen Crespi, *Biotechnology, Broad Claims and the E.P.C.*, 17 EUR. INTELL. PROP. REV. 267-68 (1995) (criticizing broad biotech patents in the European Union and United States, but acknowledging that patent attorneys' "choice is often between the broadest conceivable claim and the unacceptably narrow claim").

97. *See* TRIPS Agreement, *supra* note 1, art. 39 ("Protection of Undisclosed Information"); Reichman, *TRIPS and Developing Countries, supra* note 8, at 31-33 ("Reverse engineering in the open market for technological innovation") (citing authorities); *see also infra* text accompanying notes 188-195 (showing that developing countries should insist that a competitor's right to reverse engineer by proper means is inherent in the "honest commercial practices" standard of article 39(a) of the TRIPS Agreement, although neither that article nor article 10*bis* of the Paris Convention make this so explicit).

98. *See, e.g.*, Pacón, *supra* note 82, at 343-45 (stressing that, while developing countries control most of the world's genetic resources of interest to firms in developed countries, the former "lack the necessary capital and technology to profit from this wealth"); Claudio R. Frischtak, *Harmonization Versus Differentiation in Intellectual Property Right Regimes, in* GLOBAL DIMENSIONS OF INTELLECTUAL PROPERTY RIGHTS IN SCIENCE AND TECHNOLOGY 89, 93-94 (Mitchel B. Wallerstein et al. eds., 1993); Stewart, *Technology Transfer for Development, in* SCIENCE AND TECHNOLOGY — LESSONS FOR DEVELOPMENT POLICY 301, 322-23 (R.E. Evenson & G. Ranis eds., 1990). *Cf. also* Klaus Bosselmann, *Plants and Politics: The International Legal Regime Concerning Biotech-*

make sense even in the same country. In India, for example, low patent protection for pharmaceuticals arguably favored the manufacture of generic drugs in the past, but higher levels of protection under the TRIPS Agreement may stimulate needed future investment in local research and development.[99]

In other words, setting the appropriate level of protection is complicated by the fact that numerous developing countries already possess the capabilities for undertaking biogenetic research, which they wish to augment, and by the prospects for joint ventures with firms in developed countries, which may depend upon the availability of strong patent protection.[100] Adoption of the appropriate mix of legal incentives for biotechnology will thus require a sustained exercise in national policymaking, which should result in an undogmatic accommodation of local law to those elements of foreign law and practice that best advance long-term national interests.

In the meantime, firms in developing countries have the right to use biotechnological processes that fail to meet the nonobviousness standard of their domestic patent laws, and conversely, they may seek patents abroad for any such inventions of their own that would not be eligible for protection at home. Governments in developing countries should also continue to regulate the manner in which foreign firms obtain access to local germ plasm, with a view to sharing in both the technical knowledge that may result and the proceeds of commercial exploitation.[101]

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nology and Biodiversity, 7 COLO. J. INT'L ENVTL. L. & POL'Y 111, 128 (1995) (warning that European biotech firms may move to United States to escape legal obstacles to patent protection).

99. *See, e.g.*, Adelman & Baldia, *supra* note 3, at 525-33; Reichman, *Compliance with TRIPS*, *supra* note 6, at 378-81.

100. *See generally* Reichman, *TRIPS and Developing Countries*, *supra* note 8, at 9-10 (citing authorities).

101. *See, e.g.*, Rebecca L. Margulies, *Protecting Biodiversity: Recognizing International Intellectual Property Rights in Plant Genetic Resources*, 14 MICH. J. INT'L L. 322 (1993); Ian Walden, *Preserving Biodiversity: The Role of Property Rights, in* INTELLECTUAL PROPERTY RIGHTS AND BIODIVERSITY CONSERVATION 176-97 (T. Swanson ed., 1995). *See also* Bosselmann, *supra* note 98, at 141-47.

(ii) *Information Technologies*

In contrast, developing countries generally have little interest in patenting computer programs despite their growing mastery of information science because they stand to gain significant advantages from reverse-engineering and from independently developed applications of foreign know-how.[102] The TRIPS Agreement facilitates this preference by opting primarily for copyright protection of computer programs, as supplemented by trade secret law;[103] it makes no mention of patent protection, the availability of which remains controversial even in the developed countries.[104]

It is true that WTO member states could not implement a field-specific exclusion of computer-related inventions from patentability[105] and that the trend in both the U.S. and Japan favors expanding patent protection of such inventions.[106] Nevertheless, the patent authorities in developing countries may make use of all the formidable obstacles to patentability that the developed countries themselves employed in the recent past, when the patenting of computer programs was more strongly disfavored.[107] Any "WTO dispute-settlement panel

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102. *See, e.g.*, Robert Schware, *Software Industry Entry Strategies for Developing Countries: A "Walking on Two Legs" Proposition*, 20 WORLD DEV. 143-64 (1992) (noting that, on the negative side, computer technology is advancing so rapidly that countries not in the market may find it increasingly difficult to catch up, while even those in the market are handicapped by the lack of infrastructure and by a shortage of high-level design skills and tools).

103. *See* TRIPS Agreement, *supra* note 1, arts. 10(1), 39; *infra* text accompanying notes 188-195.

104. *See, e.g.*, Samuelson et al., *Manifesto*, *supra* note 25, at 2361-65; Henri W. Hanneman, *Patentability of Computer Programs in Europe*, *in* THE LAW OF INFORMATION TECHNOLOGY IN EUROPE 1992: A COMPARISON WITH THE U.S.A. 69-85 (A.P. Meijboom & C. Prins eds., 1991).

105. *See* TRIPS Agreement, *supra* note 1, art. 27(1), (2), (3). While TRIPS Agreement, *supra* note 1, art. 10(2) expressly opts to treat computer programs as "literary works" under the Berne Convention, article 9(2) expressly excludes copyright protection for "ideas, procedures, methods of operation or mathematical concepts as such." Arguably, this leaves some undefined room for the patenting of some computer programs, at least in principle. *See also* Reichman, *Know-How Gap in TRIPS*, *supra* note 50, at 763, 768-71.

106. *See, e.g.*, *In re* Trovato, 60 F.3d 807 (Fed. Cir. 1995), *vacating In re* Trovato, 42 F.3d 1376 (Fed. Cir. 1994); *In re* Beauregard, 53 F.3d 1583 (Fed. Cir. 1995); *In re* Alappat, 33 F.3d 1526 (Fed. Cir. 1994).

107. *See* Reichman, *Know-How Gap in TRIPS*, *supra* note 50, at 769-70 (citing authorities):

charged with investigating complaints that certain states did not adequately recognize program-related patents would logically have to take these restrictive state practices into account."[108]

The TRIPS Agreement thus "leaves both developed and developing countries free to determine the level of [patent] protection to be afforded program-related inventions within their domestic jurisdictions but not free to impose their . . . [respective] decisions on other member countries."[109] As a result, developing country firms operating in the field of computer technology may seize on the unavailability of patent protection at home to freely exploit programs that are patented in the developed countries, provided they take care not to infringe on copyrights and trade secret rights pertinent to the same programs.[110] Furthermore, local firms capable of developing computer programs that qualify for patent protection abroad may obtain this protection even though similar protection is not available at home. This follows because both the

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> The patent offices in developing countries could, accordingly, consider judicial exclusions pertaining to laws of nature and naturally occurring phenomena; to scientific principles or mathematical formulas; to abstract ideas, such as methods for doing business; to mental processes as such; and, in the European Union, to "presentations of information." It would further have to evaluate the complex doctrinal tools that courts in different countries use to distinguish claims that recite statutory subject matter from those that merely contain algorithms or other unprotectable subject matter. Finally, an investigative panel might have to consider state practice concerning application of the international nonobviousness standard to the program-related inventions under review, which would immerse it in one of the thorniest and most controversial issues of them all.

Id., at 770-71 (citing authorities).

108. Reichman, *Know-How Gap in TRIPS, supra* note 50, at 769-70.

109. Reichman, *Intellectual Property and the GATT, supra* note 8, at 33.

110. The TRIPS Agreement does not deal with the scope of protection for copyrightable programs as such, *see infra* text accompanying notes 139-153, nor does it deal with the reverse-engineering of allegedly secret program codes, *see infra* text accompanying notes 188-196. At present, neither copyright nor trade secret protection as construed in the developed countries constitute serious barriers to would-be competitors willing to invest in reverse-engineering uncopyrightable ideas by honest means. *See, e.g.*, TRIPS Agreement, *supra* note 1, art. 9(2); Reichman, *Know-How Gap in TRIPS, supra* note 50, at 779-86.

TRIPS Agreement and the Paris Convention prevent member countries from requiring material reciprocity in this regard.[111]

2. *Other Proprietary Rights in Scientific and Technical Information*

To the extent that the TRIPS Agreement strengthens the protection of traditional literary and artistic works and of sound recordings, performers' renditions, and radio and television broadcasts,[112] it expresses the tenets of a worldwide cultural policy in which the goal of economic efficiency has sometimes been subordinated to the needs of a specialized market for cultural goods.[113] This does not mean that the developing countries should forego opportunities to maintain a competitive balance that favors users and competitors when implementing the copyright and neighboring rights provisions of the TRIPS Agreement and the relevant provisions of the Berne and Rome Conventions on which they rest.[114] It does mean that states cannot expect sympathy from the international community when they tolerate free-riding duplication of cultural goods devised primarily for entertainment and private

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111. *See supra* notes 7 and 10 and accompanying text; Paris Convention, *supra* note 10, art. 4*bis* (1), (2) (principle of independence of patents).

112. *See* TRIPS Agreement, *supra* note 1, art. 9 (incorporating by reference Berne Convention 1971, *supra* note 10, arts. 1-21 (except for art. 6*bis*)), 10-14; Silke von Lewinski, *The Role of Copyright in Modern International Trade Law*, 161 REVUE INTERNATIONALE DU DROIT D'AUTEUR [R.I.D.A.] 5 (1994); Yves Gaubiac, *Une dimension internationale nouvelle du droit d'auteur: L'Accord sur les aspects des droits de propriété intellectuelle qui touchent au commerce de l'accord de Marrakech instituant l'organisation Mondiale du Commerce*, 166 R.I.D.A. 3 (1995).

113. *See, e.g.*, Neil Weinstock Netanel, *Copyright and a Democratic Civil Society*, 106 YALE L. J. 283, 324-36, 363-64, 385-87 (1996); Reichman, *Collapse of the Patent-Copyright Dichotomy*, *supra* note 26, at 485-89 ("Negative Economic Premises Underlying the Dominant Legal Paradigms"), 492-96 ("Literary and Artistic Works"). *See also* PAUL GOLDSTEIN, COPYRIGHT'S HIGHWAY — THE LAW AND LORE OF COPYRIGHT FROM GUTTENBERG TO THE CELESTIAL JUKEBOX 165-201 (1994); Paul Edward Geller, *Must Copyright Be Forever Caught Between Marketplace and Authorship Norms?*, *in* OF AUTHORS AND ORIGINS: ESSAYS ON COPYRIGHT LAW 159-202 (Brad Sherman & Alain Strowel eds., 1994).

114. *See supra* notes 10 and 112; Gana, *supra* note 8, at 759-68. *See also* ALAIN STROWEL, DROIT D'AUTEUR ET COPYRIGHT—DIVERGENCES ET CONVERGENCES 235-49, 287-91 (1993); Hamilton, *supra* note 15, at 631-33; L. Ray Patterson, *Copyright and "The Exclusive Right" of Authors*, 1 J. INTELL. PROP. L. 1, 16-42 (1993).

consumption,[115] as distinct from efforts to limit the costs of information goods that are indispensable for national economic development.[116] Developing countries will also want to avoid unduly weakening the position of their own authors and artists when invoking internationally recognized safeguards to soften the exclusive rights afforded by their domestic laws.

In a world governed by universal norms of copyright and related rights protection, developing countries and countries in transition will increasingly find markets for broadcasts, sporting events, music, and other cultural productions that can become a source of foreign exchange. To this end, these countries will need to establish an institutional framework, including national collection societies, in order to ensure that public and private funds invested in the production of cultural goods bear fruit on both domestic and foreign markets. These agencies may also assist local authors and artists in restoring copyright or neighboring rights protection to any works of national origin that foreign authorities must now remove from the public domain by virtue of the Berne Convention and relevant provisions of the TRIPS Agreement.[117]

Serious problems nonetheless arise because educational, scientific and technical communities in developing countries often depend on foreign publications without necessarily possessing the resources to pay the prices such publications fetch in the developed countries. Still other problems stem from the recent extension of copyright protection to non-traditional subject matters, especially computer programs and other electronic information tools, in a manner that creates legal barriers to entry for local entrepreneurs while raising the costs of production in general.[118] Measures to counteract these tendencies are outlined below.

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115. *See, e.g.*, Hansen, *supra* note 14; Eric H. Smith, *Worldwide Copyright Protection Under the TRIPS Agreement*, 29 VAND. J. TRANSNAT'L L. 559 (1996).

116. *See, e.g.*, Gana, *supra* note 8, at 762-63 (stressing high cost of cultural goods as limiting access by poorer countries).

117. *See* TRIPS Agreement, *supra* note 1, arts. 14(6), 70(2), (3); 17 U.S.C. sec. 104(A) (1994); Reichman, *Universal Minimum Standards*, *supra* note 6, 367-70 (citing authorities). *See also* Jaszl, *supra* note 14, at 606-11.

118. *See, e.g.*, Carlos M. Correa, *TRIPS Agreement: Copyright and Related Rights*, 25 INT'L REV. INDUS. PROP. & COPYRIGHT L. 543-52 (1994); J.H. Reichman, *Electronic Information Tools—The Outer Edge of World Intellectual*

a. *Educational and Scientific Works in General*

Developing countries may fully exploit those features of the mature copyright paradigm that promote the public interest in the free exchange of ideas and that otherwise reduce the social costs of protection. For example, exceptions to, or limitations on, the author's exclusive rights are widely recognized for purposes of classroom teaching, research and private study, libraries and archives, and other educational and charitable purposes.[119] These exceptions are further reinforced by the fair use defense as broadly interpreted in some countries, especially the United States.[120]

In this connection, Article 13 of the TRIPS Agreement requires member states to "confine limitations or exceptions to exclusive rights to certain special cases which do not conflict with a normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the right holder."[121] This language was drawn from Article 9(2) of the Berne Convention (which applied only to the reproduction right) and extended to all the author's exclusive rights under TRIPS (and thus, by extension under the Berne Convention, too).[122] Article 13 can thus be read as cutting back upon some pre-existing exceptions and limitations.[123]

Property Law, 24 INT'L REV. INDUS. PROP. & COPYRIGHT L. 446 (1993) [hereinafter Reichman, *Electronic Information Tools*].

119. *See, e.g.*, Jane C. Ginsburg, *Reproduction of Protected Works for University Research or Teaching*, 39 J. COPYRIGHT SOC'Y 181, 188-97 (1992); *Cf.* 17 U.S.C. secs. 108, 110, 113, 117, 118, 120, 121 (1994 Supp. 1996). *See generally* SAM RICKETSON, THE BERNE CONVENTION FOR THE PROTECTION OF LITERARY AND ARTISTIC WORKS: 1886-1986, at 477-548 (1987).

120. *See* TRIPS Agreement, *supra* note 1, art. 13; Berne Convention, *supra* note 10, arts. 9, 10, 10*bis*; W.I.P.O. GUIDE TO THE BERNE CONVENTION FOR THE PROTECTION OF LITERARY AND ARTISTIC WORKS (PARIS ACT, 1971) 55-63 (1978) [hereinafter WIPO GUIDE TO BERNE CONVENTION]. *See also* A. STROWEL, *supra* note 114, at 633-38; L. RAY PATTERSON & STANLEY W. LINDBERG, THE NATURE OF COPYRIGHT: A LAW OF USERS' RIGHTS 191-92, 196-200 (1992).

121. *See* TRIPS Agreement, *supra* note 1, art. 13.

122. *See* Berne Convention, *supra* note 10, arts. 9(1), (2); TRIPS Agreement, *supra* note 1, arts. 9(1), 11, 14.

123. *See, e.g.*, Correa, *Copyright and Related Rights*, *supra* note 118, at 549 (noting view that Article 13 represents "a 'Berne-minus' solution"); Gana, *supra* note 8, at 760-62 (fearing overly literal interpretation of Article 13).

There is no legislative history to support that reading,[124] however, while even the literal language of Article 9(2) of the Berne Convention can only be understood in terms of state practice, which varies widely in the absence of any uniform law or consensus about these matters.[125] Subsequent developments have recently shed more light on the meaning of Article 13.

For example, the Preamble to the 1996 WIPO Copyright Treaty for the digital age, adopted by a Diplomatic Conference in Geneva on December 20, 1996, expressly recognizes the "need to maintain a balance between the rights of authors and the larger public interest, particularly education, research, and access to information, as reflected in the Berne Convention."[126] The Agreed Statement concerning Article 10 of this new treaty[127] further permits "Contracting Parties to carry forward and appropriately extend into the digital environment limitations and exceptions in their national laws which have been considered acceptable under the Berne Convention" and "to devise new exceptions and limitations that are appropriate in the digital network environment."[128] The Agreed Statement also clarifies that Article 10(2) of the 1996 WIPO Treaty,

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124. *But see* Correa, *Copyright and Related Rights*, *supra* note 118, at 549 (noting that the drafters of Article 13 ignored the broad and better defined exceptions contained in Article 15(1) of the Rome Convention, *supra* note 10, even though they incorporated selected principles of that treaty into the TRIPS Agreement).

125. *See, e.g.*, RICKETSON, *supra* note 119, at 485-88 (noting that research and education were clearly contemplated (though copying for teaching technically falls under Article 10(2)) as well as certain industrial and commercial purposes plus a variety of other uses recognized by national laws); Ginsburg, *supra* note 119, at 190-91 (discussing outright exemptions for teaching in Ireland, Switzerland, Liechtenstein, and New Zealand), 192-97 (discussing statutory licenses favoring educational copying in Australia, the United Kingdom and the Nordic countries). *See also* A. STROWEL, *supra* note 114, at 633-38 (noting proliferation of compulsory licenses to promote social goals in Germany and, to a lesser extent, even France).

126. *See* WIPO Copyright Treaty, *supra* note 18, Preamble, fifth clause. This treaty is a "special agreement" between members of the Berne Union. *See id.*, art. 1(1); Berne Convention, *supra* note 10, art. 20.

127. *See* WIPO Copyright Treaty, *supra* note 18, art. 10(1) (essentially repeating Berne Convention, *supra* note 10, arts. 9(2), 10(2)) (essentially repeating TRIPS Agreement, *supra* note 1, art. 13).

128. *See* Agreed Statements Concerning the WIPO Copyright Treaty, 1996, *supra* note 18, concerning Article 10, first para.

which parallels Article 13 of the TRIPS Agreement,[129] "neither reduces nor extends the scope of applicability of the limitations and exceptions permitted by the Berne Convention."[130]

Against this background, the developed countries cannot use Article 13 of the TRIPS Agreement to prevent developing countries from applying limitations and exceptions parallel to those already recognized in state practice, with a view to encouraging price discrimination and other concessions in favor of research, education, libraries, and other public-good uses.[131] On the contrary, it is the participation of developing countries in future discussions about these issues that should help to determine the outer limits of the "fair use" doctrine in international law.

Developing countries may also exploit many works whose terms of protection have expired in the countries of origin. To this end, developing countries may find it expedient to adopt only the minimum terms of protection that international law requires and not the longer terms that the European Union and the United States are in the process of enacting.[132] Developing countries may also routinely invoke the

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129. *See supra* note 127.

130. *See* Agreed Statements Concerning the WIPO Copyright Treaty, 1996, *supra* note 18, concerning Articles 10, second para.

131. For the importance of the fair use exceptions (or their foreign law analogues) in ensuring that research and educational users will be charged prices they can afford for data and information that constitute the building blocks of knowledge in an information age, see Reichman & Samuelson, *supra* note 24, at 151-63.

132. For example, the TRIPS Agreement (in combination with the Berne Convention) requires a life-plus-fifty term for works authored by natural persons, a term of fifty years for most corporate works or other protected productions, and a term of twenty-five years for copyrightable works of applied art. *See* TRIPS Agreement, *supra* note 1, arts. 12, 14(5); Berne Convention, *supra* note 10, art. 7(4). *See also* TRIPS Agreement, *supra* note 1, art. 14(5) (regarding minimum fifty year terms for neighboring rights of performers and producers of sound recordings and minimum twenty year term for rights of broadcasting organizations). In contrast, non-corporate works now obtain a life-plus-seventy term in the European Union and may obtain a similar term in the United States; corporate productions will increasingly obtain a seventy-year term in the European Union and may soon obtain a minimum term of ninety-five years (instead of the current seventy-five year minimum) in the United States. *See, e.g.*, Dennis S. Karjala, *Comment of U.S. Copyright Law Professors on the Copyright Office Term of Protection Study*, 16 EUR. INTELL. PROP. REV. 531 (1994).

rule of the shorter term under the Berne Convention[133] against foreign works given longer protection than that required by the TRIPS Agreement,[134] in order to maximize the competitive prospects inherent in the growing disparities with respect to the terms of protection under the domestic laws.

For reasons that remain unclear, many developing countries appear to have allowed preferential measures added to the Berne Convention in 1971 to lapse, despite the compulsory licenses they made available for teaching, scholarship, and research purposes,[135] and few developing countries even invoked these provisions. These countries may, nonetheless, address the high cost of foreign publications by adopting the "fair use" exceptions and limitations discussed above, by importing cheap but genuine editions under the doctrine of international exhaustion,[136] and by direct regulation of licensing agreements under the beefed-up competition laws discussed below. In this latter connection, states may also use compulsory licenses to repress abuses of market power, which include monopolistic pricing.[137]

When feasible, developing countries and countries in transition should encourage foreign publishers to set up local production or distribution facilities, which keeps publishers in touch with the needs of the market and gives them a greater stake in adopting prices and practices that pay future dividends. At the same time, the most effective long-term strategy for reducing the high costs of scientific and technical publications entails the participation of developing countries in current efforts to build electronic research communications net-

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133. *See* Berne Convention, *supra* note 10, art. 7(8); WIPO GUIDE TO BERNE CONVENTION, *supra* note 120, at 50-51.

134. *See supra* note 132 (duration under TRIPS Agreement).

135. *See* Berne Convention, *supra* note 10, art. 21 and Appendix, Art. I; RICKETSON, *supra* note 119, at 663-64 (noting that few developing countries have ever made use of the complicated procedures set out in the Appendix, and that most are concerned about protecting their own authors' rights).

136. *See* TRIPS Agreement, *supra* note 1, art. 6 (declining to address problem of international exhaustion); *infra* note 174 and accompanying text.

137. *See* TRIPS Agreement, *supra* note 1, arts. 8(2), 40. Concerns about educational texts not sold "at a price reasonably related to that normally charged in the [developing] country for comparable works," *see* Berne Convention, *supra* note 10, Appendix, art. III, may now have to be treated as questions of abuse, which typically make the existence of market power a relevant factor. *See infra* text accompanying notes 159-180.

works that bypass conventional print publishers. This topic is discussed below in connection with other measures to bolster the acquisition and dissemination of technical knowledge.[138]

b. *Electronic Information Tools*

By bringing computer programs within the international copyright system, the TRIPS Agreement has outlawed the kind of wholesale duplication that jeopardized the ability of innovators to appropriate the benefits of their investments.[139] Its provisions require developing countries not only to prevent local firms from engaging in the wholesale duplication of foreign computer programs, but also to maintain border controls for the purpose of excluding imports of counterfeit programs from third countries. Software producers must also enjoy the exclusive rights specified in the Berne Convention, the rental rights conferred by the TRIPS Agreement, and the minimum term of fifty years that this Agreement further imposes.[140]

However, the TRIPS Agreement "says nothing about the eligibility criteria that states must apply to this controversial subject matter; nor, apart from a generalized exclusion of 'ideas, procedures, methods of operation or mathematical concepts as such,' does the Agreement concern itself with the scope of protection or other issues that have taxed domestic courts and legislatures."[141] The developing countries may, therefore, craft their own copyright laws with an eye to exploiting those tailor-made features and safeguards that courts and legislators in leading developed countries have instituted in order to preserve a proper balance between incentives to create and free competition. These safeguards leave ample room for

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138. *See infra* text accompanying notes 280-291.

139. *See* TRIPS Agreement, *supra* note 1, art. 10(1).

140. *See* TRIPS Agreement, *supra* note 1, arts. 9-12; *see also id.*, arts. 51-60 ("Special Requirements Related to Border Measures"); Jasna Arsi *Combating Trade in Counterfeit Goods: The GATT and the E.C. Approaches*, 18 WORLD COMPETITION 75, 80-87 (1995) (doubting the efficacy of these enforcement procedures); Thomas Dreier, *TRIPS and the Enforcement of Intellectual Property Rights, in* FROM GATT TO TRIPS — THE AGREEMENT ON TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS 248, 265-67, 271-73 (F.K. Beier & G. Schricker eds., 1996).

141. Reichman, *Know-How Gap in TRIPS*, *supra* note 50, at 775; *see* TRIPS Agreement, *supra* note 1, art. 9(2); *see also* Pamela Samuelson, *Comparing U.S. and E.C. Copyright Protection for Computer Programs: Are They More Different Than They Seem?*, 13 J.L. & COM. 279 (1994).

second-comers in developing countries to re-implement non-copyrightable technical ideas in independently coded programs of their own that are functional equivalents of copyrightable programs originating from developed countries.[142]

This investigator has recently reviewed the many limiting devices available to courts and administrators in developing countries if they adopt the "successive filtering test" that the federal courts use to implement the "thin" copyright doctrine in the United States,[143] and there is no need to rehearse them

142. Previous studies have shown that a computer program is "a machine whose medium of construction happens to be text," Samuelson et al., *Manifesto, supra* note 25, at 2319, and that its main source of value lies in the useful behavior produced when program instructions are executed. *See id.*, at 2308, 2318, 2320-24. Because this valuable behavior results primarily from the industrial design phase of software development, including the design of its interfaces (and not from the writing of source code to implement it), it runs afoul of traditional copyright doctrines that deny protection to functionally determined design solutions as such. *See id.*, at 2327-31 (stressing that writing code is far less creative than the design phase and commands a relatively insignificant share of the innovator's overall investment in research and development); *see also id.*, at 2332-65; J.H. Reichman, *Overlapping Proprietary Rights in University-Generated Research Products: The Case of Computer Programs*, 17 COLUM.-VLA J.L. & ARTS 51, 88-109, 122-24 (1992). Because most federal appellate courts in the United States have accordingly applied the "thin" copyright doctrine to limit the scope of protection afforded copyrightable computer programs, a "competitor's non-literal 'copying,' in whole or substantial part, may imitate functional design aspects of the originator's program," if it avoids duplicating the code except as needed to achieve interoperability or to extract noncopyrightable ideas. Reichman, *Know-How Gap in TRIPS, supra* note 50, at 779 (citing authorities); *see also* Pamela Samuelson, *Fair Use for Computer Programs and Other Copyrightable Works in Digital Form: The Implications of Sony, Galoob, and Sega*, 1 J. INTELL. PROP. L. 49 (1993). Nothing in the TRIPS Agreement or the Berne Convention as it stands impedes this trend "because they say little or nothing about the scope of protection that copyrighted computer programs should receive as 'literary works.'" Reichman, *Know-How Gap in TRIPS, supra* note 50, at 779.

143. *See, e.g.*, Computer Assocs. Int'l, Inc. v. Altai, Inc., 982 F.2d 693 (2d Cir. 1992); Lotus Dev. Corp. v. Borland Int'l, Inc., 49 F.3d 807 (1st Cir. 1995), *aff'd by an equally divided Court*, 116 S. Ct. 804 (1996); Sega Enters. v. Accolade, Inc., 977 F.2d 1510 (9th Cir. 1992); Reichman, *Know-How Gap in TRIPS, supra* note 50, at 774-84. *See also* JONATHAN BAND & MASANOBU KATOH, INTERFACES ON TRIAL — INTELLECTUAL PROPERTY AND INTEROPERABILITY IN THE GLOBAL SOFTWARE INDUSTRY 83-165 (1995); Pamela Samuelson, *Computer Programs, User Interfaces, and Section 102(b) of the Copyright Act of 1976: A Critique of* Lotus v. Paperback, 55 LAW & CONTEMP. PROBS. 311 (1992).

here. Should rights-holders press the issue,[144] the developing countries may defend the pro-competitive implications of these doctrines before duly constituted dispute-settlement forums operating within the framework of the WTO Agreement as a whole.[145] So long as the relevant panels are staffed by qualified, impartial, and representative experts,[146] there is reason to believe that the traditional limits on copyright protection of functional works that domestic courts have so far applied to computer programs will also prevail at the international level, to the benefit of consumers everywhere. In this context, the more scrupulously a given developing country implements its obligations under the TRIPS Agreement to protect copyrightable literary and artistic works in general, including the expressive features of computer programs, the more credit it will earn in the eyes of any international tribunal charged with evaluating its application of the "thin protection" doctrine to nonprotectable, functionally determined components of computer programs.

For this and other reasons, the insistence of special interests in the developed countries that computer programs be treated "as literary works" under international law, "with no corresponding prohibitions against the copying of non-copyrightable functional components, may boomerang against its proponents."[147] So long as competitors in the developing countries master lawful techniques of reverse-engineering, they can usually imitate the foreign producers' non-copyrightable know-how[148] and still compete as fair followers (rather than as free riders) on the global software market.[149]

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144. *See, e.g.*, Smith, *supra* note 115, at 572 (suggesting that rights-holders may seek to have the scope of protection for computer programs brought before the Council for TRIPS).

145. *See, e.g.*, Dreyfuss & Lowenfeld, *supra* note 62 (discussing criteria that dispute settlement panels should adopt in cases like these).

146. *See, e.g.*, Otten & Wager, *supra* note 6, at 411-12.

147. Reichman, *Know-How Gap in TRIPS, supra* note 50, at 784.

148. *See* Reichman, *Know-How Gap in TRIPS, supra* note 50, at 784-86; BAND & KATOH, *supra* note 143, at 167-225. *See also* Samuelson et al., *Manifesto, supra* note 25, at 2365-71, 2405-28 (criticizing copyright approach to computer programs and proposing modified liability regime to protect applied know-how as such); *infra* text accompanying notes 228-249.

149. However, the domestic trade secret laws must be respected. *See* TRIPS Agreement, *supra* note 1, art. 39.

It follows that governments in developing countries should encourage software producers to cultivate or acquire the skills needed to benefit from the analytical use of non-copyrightable technical ideas embodied in foreign computer programs.[150] These governments may also wish to devise suitable legal incentives for local firms that successfully develop their own non-copyrightable applications of computer know-how to industry.[151]

Finally, developing countries will have to consider strategies to cope with growing efforts to commercialize data, including scientific and technical data, which have led the European Union to adopt a *sui generis* regime to protect non-copyrightable databases.[152] To the extent that such measures fall outside of the TRIPS Agreement, the developing countries will enjoy greater leeway in fashioning appropriate instruments to meet this challenge, and suggestions to this end are discussed later in this Article.[153]

3. *Ancillary Intellectual Property Regimes*

The developing countries have unique opportunities to compete in markets for subpatentable innovation owing to a combination of labor and other cost advantages with local craft and design skills. The provisions of the TRIPS Agreement pose no insuperable obstacles to capitalizing on these opportunities, and, in some respects, such as the now universal

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150. *See generally* Schware, *supra* note 102.

151. *See infra* text accompanying notes 197-249.

152. *See* E.C. Directive on Databases, *supra* note 21; *see also* H.R. 3531, *supra* note 21; Reichman & Samuelson, *Intellectual Property Rights in Data?*, *supra* note 24.

153. *See infra* text accompanying notes 228-249 (proposing the use, by developing countries, of a hybrid liability regime to encourage subpatentable innovation). Whether non-copyrightable databases fall outside the seven categories of "intellectual property" covered by the TRIPS Agreement, *supra* note 1, art. 1(2), for purposes of avoiding even the national treatment provisions, *id.*, art. 3 (or those of the Paris and Berne Conventions) remains open to interpretation. For one view that they may not, see Smith, *supra* note 115, at 577-78; *but see* E.C. Directive on Databases, *supra* note 21, art. 11 (imposing reciprocity and not national treatment).

requirement of trade secret protection that is discussed below, it probably operates as a fillip to local innovation.[154]

The TRIPS Agreement also requires developing countries to provide some form of *sui generis* protection for integrated circuit designs, plant varieties, and industrial designs.[155] The implications of these provisions are explored below, in the larger context of devising means to stimulate subpatentable innovation in these countries.[156]

B. *Using Competition Law to Curb the Abuse of Market Power*

Recent studies encourage governments in developing countries to allocate resources for the system-wide capture and diffusion of technology, with a view to reinforcing the project-specific initiatives of single enterprises.[157] "These efforts to lessen dependence on foreign suppliers of technological goods, however, conflict with the countervailing policies of developed countries to restrict the flow of technical knowledge and to enhance the appropriability of technical yields . . . [,] [which] make it harder for firms in developing countries to gain access to the most valuable new technologies."[158] When

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154. *See infra* text accompanying notes 182-196 (describing how trade secret laws have traditionally encouraged innovation and how the TRIPS Agreement can be implemented to continue this tradition).

155. TRIPS Agreement, *supra* note 1, arts. 25-26, 27(3)(b), 35-38; Reichman, *Universal Minimum Standards*, *supra* note 6, at 358-59, 373-77.

156. *See infra* text accompanying notes 197-282.

157. *See, e.g.*, Paul A. David & Dominique Foray, *Accessing and Expanding the Science and Technology Knowledge Base*, 16 SCI., TECH., INDUSTRY REV. [STI] 13, at 38-47, 59-62 (OECD pub. 1995); Soete, *supra* note 29, at 14-20. *See also infra* text accompanying notes 260-291 (arguing that governments should remove barriers to the transfer of scientific and technical knowledge and promote the creation of a communications infrastructure to disseminate such information).

158. Reichman, *Compliance with TRIPS*, *supra* note 6, at 375. For the tendency of governments in developed countries to view their antitrust laws as instruments for preserving competition for the sake of economic efficiency and, from this perspective to permit horizontal collaborative practices (including joint research among natural competitors and pooled licensing agreements) on the theory that few, if any, anti-competitive effects will result, see *supra* note 22 and accompanying text, and *infra* note 162. *See also* Wolfgang Fikentscher, *Collaborative Activities Among Industrial Competitors—In German, European, and U.S. Antitrust Law, and in the Draft International Antitrust Code in the GATT/WTO System*, *in* INTERNATIONAL HARMONIZATION OF COMPETITION LAWS 109 (Chia-Jui Cheng et al. eds., 1995).

developed countries interpret their antitrust laws so as to promote the kind of business freedom that leads to short-term wealth maximization in a global market, the effects of any diminished competitive opportunities in the developing countries may be magnified by higher international intellectual property standards, which were supposedly designed to prevent free-riders from appropriating the fruits of private investments in research and development. In this climate, the harmonization of intellectual property rights can mask the erection of legal and economic barriers to entry that may retard the developing countries' efforts to improve their own technical capabilities.[159]

Formulating appropriate legal and economic responses to these problems thus becomes a necessary but delicate task. For example, developing countries may devise tailor-made applications of their domestic antitrust laws (or competition laws, as they are known abroad) to deal with the "misuse" or "abuse" of intellectual property rights. These doctrines fall in the largely uncharted and controversial borderland between legal monopolies to stimulate technological advances and legal restraints on monopolies or on anti-competitive practices.[160] In this zone, territorial law prevails and there is no international instrument regulating competition law as such,[161] nor is there any widespread consensus concerning the appropriate legal measures that might facilitate early adoption of such a convention.[162]

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159. *See supra* notes 157-158 and accompanying text; Correa, *supra* note 53, at 369-80; Bifani, *supra* note 27, at 160-64.

160. *See supra* note 22 and accompanying text; Ulrich Loewenheim, *Antitrust Aspects of Intellectual Property—Reviewed From a German and European Viewpoint*, *in* INTERNATIONAL HARMONIZATION OF COMPETITION LAWS 289-96 (Chia-Jui Cheng et al. eds., 1995). *See also* Spencer Weber Waller & Noel J. Byrne, *Changing Views Of Intellectual Property and Competition Law in the European Community and the United States of America*, 20 BROOK. J. INT'L L. 1-24 (1993).

161. *See, e.g.*, Eleanor M. Fox, *Competition Law and the Agenda for the WTO: Forging the Links of Competition and Trade*, *in* ANTITRUST: A NEW INTERNATIONAL TRADE REMEDY? 1 (John O. Haley & Hiroshi Iyori eds., 1995).

162. *See, e.g.*, Ullrich, *TRIPS*, *supra* note 22, at 186-210; Eleanor M. Fox, *Trade, Competition, and Intellectual Property—TRIPS and Its Antitrust Counterparts*, 29 VAND. J. TRANSNAT'L L. 481, 486-91 (1996) [hereinafter Fox, *TRIPS and Antitrust*]. Legal theory also remains broadly divided between an efficiency-based antitrust paradigm and a dominance-based antitrust paradigm, although there are points of convergence (and contradictions) in the ap-

Caution is nonetheless in order because over-zealous use of the misuse doctrine, for example, can breed uncertainty, while overly intrusive antitrust rules can "reduce incentives for firms to invest in a reforming economy."[163] These dangers require developing countries to seek a balance between promoting private market incentives and the need to limit monopolistic and anti-competitive business practices that could compromise the integrity of their national systems of innovation.[164]

Against this background, the TRIPS Agreement expressly permits states to regulate abuses of intellectual property rights, subject to certain duties of cooperation and consultation, but it does not endorse any particular approach to this subject.[165] It also allows states to regulate other anticompetitive practices that "unreasonably restrain trade or adversely affect the international transfer of technology," even though such regulation

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proaches so far adopted by developing countries and countries in transition. *See, e.g.*, A.E. Rodriguez and Malcolm B. Coate, *Limits to Antitrust Policy for Reforming Economies*, 18 HOUS. J. INT'L L. 311, 316-38 (1996). Notwithstanding this lack of consensus, some scholars have proposed a Draft Antitrust Code for the WTO system. *See* Working Group, International Antitrust Code, *Draft International Antitrust Code as a GATT-WTO-Plurilateral Trade Agreement*, Munich, Germany, July 10, 1993, *reprinted in* 5 WORLD TRADE MATERIALS 126 (September 1993). *See also* Ernst-Ulrich Petersmann, *International Competition Rules for the GATT-WTO World Trade and Legal Systems*, J. WORLD TRADE 35, 35-41 (July 1993); John H. Jackson, *GATT and the Future of International Trade Institutions*, 18 BROOK. J. INT'L L. 11, 24 (1992); Fikentscher, *supra* note 158 at 119-26. For a profound critique of such proposals, *see* Fox, *TRIPS and Antitrust*, *supra*; *but see* Wolfgang Fikentscher, *The Draft International Antitrust Code: Objections and Rejoinders*, 26 INT'L REV. INDUS. PROP. & COPYRIGHT L. [IIC] 999 (1995).

163. Rodriguez & Coate, *supra* note 162, at 312; *see also id.*, at 338-57 (discussing possible effects of antitrust law on complex contracts, including joint-ventures with firms in developing countries).

164. *See generally* Fox, *TRIPS and Antitrust*, *supra* note 162, at 491-505; Ullrich, *TRIPS*, *supra* note 22.

165. *See* TRIPS Agreement, *supra* note 1, arts. 8(1), 8(2); Fox, *TRIPS and Antitrust*, *supra* note 162, at 494 (stating that "TRIPS calls for a concept of the limits of antitrust; it does not call for formulation of the core and normal scope for antitrust."); Andreas Heinemann, *Antitrust Law of Intellectual Property in the TRIPS Agreement of the World Trade Organization*, *in* FROM GATT TO TRIPS — THE AGREEMENT ON TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS 239, 241-43 (F.K. Beier & G. Schricker eds., 1996) (noting that TRIPS art. 8(2), unlike E.U. antitrust law, does not necessarily link the doctrine of abuse of an intellectual property right to a dominant position in the market).

may conflict with the exercise of intellectual property rights.[166] Finally, it expressly allows member states to scrutinize licensing practices and conditions that may produce unreasonable restraints on trade, and it sets up a framework of consultative procedures to be followed when such practices produce transnational effects.[167]

In principle, a state's right to adopt its own antitrust policies (and other transfer of technology regulations) should not vitiate that state's obligations under the TRIPS Agreement;[168] but in practice, the lack of either a normative consensus or a shared body of case-by-case empirical analysis that is sensitive to differing social and economic conditions makes "writing interface rules in advance . . . a daunting . . . enterprise."[169] The developing countries thus remain free to pick and choose from the variety of formulations and approaches that developed countries use to decide what is a progressive response of business to market conditions and what is an abuse of market power or simply a misuse of an intellectual property right, and to tailor these concepts to the needs of their own economic development strategies.[170] The developing countries should also resist premature efforts to establish international mini-

166. *See* TRIPS Agreement, *supra* note 1, art. 8(2); Heinemann, *supra* note 165, at 243 (stressing open-ended criteria to be used in balancing the need for regulation against the requirements of intellectual property protection).

167. *See* TRIPS Agreement, *supra* note 1, art. 40; Heinemann, *supra* note 165, at 244-47.

168. *See, e.g.*, TRIPS Agreement, *supra* note 1, arts. 8(1), (2), 40, 64 (invoking principle of nonviolatory acts of nullification and impairment); Reichman, *Competition Law, Intellectual Property, and Trade*, *supra* note 26, at 103-05, 107-09.

169. Fox, *TRIPS and Antitrust*, *supra* note 162, at 491 (suggesting that the TRIPS Agreement implies that "existing developed systems of antitrust are presumptively legitimate, even though they may function as a limitation on intellectual property rights"). *Cf.* GUILLERMO CABANELLAS, JR., ANTITRUST AND DIRECT REGULATION OF INTERNATIONAL TRANSFER OF TECHNOLOGY TRANSACTIONS—A COMPARISON AND EVALUATION 30 (F.K. Beier et al. eds., 1984) (comparing functions and purposes of transfer of technology regulations with those of antitrust laws). For evidence that U.S. and European courts would reach opposite conclusions concerning alleged misuse of patents in regard to such issues as monopoly pricing, refusals to deal, and contracts to limit parallel imports, see Fox, *TRIPS and Antitrust*, *supra* note 162, at 486-91.

170. *See* TRIPS Agreement, *supra* note 1, arts. 7, 8, 40(1), (2).

mum standards in this field without their full participation,[171] although they cannot prevent the developed countries from appealing to the mediatory and dispute-settlement mechanisms of TRIPS in an effort to invalidate or circumscribe the particular legal responses of different countries.[172]

When devising their overall strategies, the primary goal for developing countries should not be the control of technology transfer as such, which is best left to the private sector, but the maintenance of competitive conditions that are likely to ensure ample supplies of technological goods under reasonable terms and conditions. If competition breaks down, abuses of market power will typically make themselves felt in exorbitant prices charged for the acquisition of new technologies and in the imposition of harsh contractual conditions that unreasonably limit the purchaser's or licensee's freedom of action, especially the right to compete with foreign suppliers over time. Nonetheless, the task of distinguishing between a clear abuse of market power and a reasonable self-help corrective to risk aversion will require considerable expertise.[173]

To help restore a competitive balance without involving antitrust law, governments in developing countries can monitor markets for foreign technology in order to provide local firms with systematic intelligence about available products and prices, and they can sometimes resort to parallel imports of genuine goods at cheaper prices under the doctrine of international exhaustion.[174] When exorbitant prices result from a

171. Nevertheless, developing countries "would profit from a common front on antitrust principles, preventing a race to the bottom." Fox, *TRIPS and Antitrust*, *supra* note 162, at 494.

172. *See supra* note 167 and accompanying text; Fox, *TRIPS and Antitrust*, *supra* note 162, at 483-85. According to Professor Fox, the use of market power to create barriers to entry or to favor cartel-like behavior is almost always actionable. *Id.*, 502-03.

173. *See, e.g.*, Rodriguez & Coate, *supra* note 162, at 323-25.

174. *See* TRIPS Agreement, *supra* note 1, art. 6 (stating that "nothing in this Agreement shall be used to address the issues of exhaustion of intellectual property rights"); Oddi, *TRIPS*, *supra* note 14, at 466-67. The doctrine of international exhaustion permits imports of products covered by intellectual property rights from third countries in which they have been sold more cheaply under a policy of price discrimination. However, not all countries recognize the doctrine, there is no uniformity of practice even among countries that do recognize it, and there is some concomitant risk that suppliers will respond by elevating prices to uniformly high levels everywhere. *See, e.g.*,

combination of market power and intellectual property rights, especially patents for inventions, the developing countries may invoke the compulsory licenses that the TRIPS Agreement expressly provides.[175]

As regards legal limits on the power of technology transferors to impose harsh or oppressive conditions on their local transferees, state practice in developed countries affords an array of legal doctrines that governments in developing countries can invoke under the proper circumstances.[176] The TRIPS Agreement expressly recognizes some of these doctrines, notably "exclusive grantback conditions, conditions preventing challenges to validity and coercive package licensing," without preempting other doctrines found in state practice,[177] and it also empowers developing countries to adopt appropriate measures, when consistent with the provisions of the Agreement, to combat licensing practices that "adversely affect the international transfer of technology."[178] The developing countries will, accordingly, need to devise their own "jurisprudence of licensing," and in this connection they may consider

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Ullrich, *TRIPS*, *supra* note 22, at 186-93; Thomas Cottier, *The Prospects for Intellectual Property in GATT*, 28 COMMON MKT. L. REV. 383, 399-400 (1991). For the view that unauthorized parallel imports of patented goods under the doctrine of international exhaustion is inconsistent with the patent provisions of the TRIPS Agreement, see Straus, *Implications*, *supra* note 57, at 191-95.

175. TRIPS Agreement, *supra* note 1, arts. 7, 8(1), (2), 31, 40; Reichman, *Competition Law, Intellectual Property, and Trade*, *supra* note 26, at 99-103 ("Limits on the Patent Monopoly"), 103-05 ("Other Abuses and the Public-Interest Exception"), 107-09 ("Licensing and Unfair Competition in General").

176. These doctrines include prohibitions on tying arrangements; package licensing; territorial and field of use restrictions; restrictions on quantity, price, and publicity; grant-back provisions; patent-pooling and cross-licensing arrangements; obligations to prolong royalties beyond the expiration of proprietary rights; post-contractual restrictions; and refusals to deal. *See, e.g.*, JAY DRATLER, JR., LICENSING OF INTELLECTUAL PROPERTY ch. 7 (1996). The application of these and other doctrines varies widely from one jurisdiction to another, and these differences are magnified by conflicts of administrative philosophies. *See, e.g.*, *id.* sec. 7.01; Fox, *TRIPS and Antitrust*, *supra* note 162, at 486-502.

177. TRIPS Agreement, *supra* note 1, art. 40(2); *supra* note 165 and accompanying text.

178. TRIPS Agreement, *supra* note 1, arts. 8(2), 40(1), (2); *supra* text accompanying note 175. *See also* Heinemann, *supra* note 165, at 245 (stressing that "art. 40(2) may not be employed in order to intrude into the basic principles of intellectual property protection").

enacting a basic norm that requires agreements for the supply of technical products or knowledge to be made on "fair and equitable terms, with due regard for the needs of education, science, technological development, and the preservation of competition."[179] If cautiously applied, such a norm could facilitate administrative or judicial action in particularly egregious cases without fostering a destabilizing climate of uncertainty.[180] If incautiously applied, however, resort to fairness doctrines can push prices upwards, involve government in regulation, and could occasionally deprive technology producers of incentives to invest.

Finally, developing countries can further lower prices and promote competition in the long term by encouraging local entrepreneurs to establish alliances and networks with foreign firms at work on technologies of common interest. Alliances of this kind can increase the potential economies of scale for both partners, and they may eventually permit feedback from developing-country markets to affect the foreign ally's own investments in new applications and improvements at home.

C. *Fashioning an Intellectual Property Regime to Stimulate Local Innovation*

While strong patent and copyright protection often appears inconsistent with the needs of small and medium-sized

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179. Reichman & Samuelson, *supra* note 24, at 159. While "for better or worse, efficiency policy advocates" in the U.S. have severely limited the antitrust regulation of "conduct and transactions other than cartels and mergers that produce monopoly or cartel behavior[,]" the developing countries' perspective—"which tends to be in accord with certain U.S. policies of the 1960s—is against power, exploitation, and exclusion of the weak . . . . It is not pro-efficiency; it is anti-power and anti-bullying." Fox, *TRIPS and Antitrust, supra* note 162, at 499. *See also* Spencer Weber Waller, *Neo-Realism and the International Harmonization of Law: Lessons from Antitrust*, 42 KAN. L. REV. 557, 597-603 (1994) ("Harmonizing Values, Not Rules"); Clive S. Gray, *Antitrust as a Component of Policy Reform: What Relevance for Economic Development?, in* REFORMING ECONOMIC SYSTEMS IN DEVELOPING COUNTRIES 403, 406, 416-35 (D.H. Perkins & M. Roemer eds., 1991).

180. *Cf., e.g.*, John H. Flynn, *Antitrust Policy and the Concept of a Competitive Process*, 35 N.Y.L. SCH. L. REV. 893, 902-03, 910-15 (1990) (stressing goals of fostering equality of market access; due process for distributors; limiting power to set prices or determine access to markets; reducing imbalances in bargaining power; preventing undue wealth transfers from consumers to producers; and protecting rights of labor, property and free exchange).

firms in developing countries, it does not necessarily follow that unbridled competition with respect to subpatentable applications of technical know-how to industry always benefits local firms, even when this option remains permissible under the TRIPS Agreement. On the contrary, the stimulation of subpatentable innovation everywhere requires that investors enjoy some reasonable opportunities to appropriate the fruits of their investment, notwithstanding their competitors' rights to imitate or reverse-engineer any novel product or process to which the innovators' research and development give rise.[181] How developing countries could best address this problem raises a number of interesting issues with which legal theory has recently begun to grapple.

1. *Natural Lead Time Under Classical Trade Secret Law*

Traditionally, the market economies relied on trade secret laws (or related laws of confidential information) to counteract the risk of market failure that arose if second-comers could too freely appropriate the fruits of an innovator's time, money, and skilled efforts without making any corresponding investments of their own. Trade secret laws do not confer exclusive property rights on those whose innovations fall below the now worldwide standard of nonobviousness for eligibility in patent law.[182] This follows because routine engineers would, in theory, make these subpatentable innovations in due course if the level of investment were not unduly diminished by fears of market failure.[183]

Rather, trade secret laws require third parties to reverse-engineer new and successful products by honest means, with a view to mastering the innovative processes from which they

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181. *See, e.g.*, KINGSTON, *supra* note 30 and accompanying text; C. Owen Paepke, *An Economic Interpretation of the Misappropriation Doctrine: Common Law Protection for Investments in Innovation*, 2 HIGH TECH. L.J. 55, 77 (1987); Rochelle C. Dreyfuss, *Dethroning Lear: Licensee Estoppel and the Incentive to Innovate*, 72 VA. L. REV. 677, 696-700 (1986). *See also* Gordon, *supra* note 30, at 223-24, 230-38; Dreyfuss, *supra* note 30, at 897-98.

182. *See supra* notes 62-62 and accompanying text (discussing the international treatment of the criterion for "nonobviousness").

183. *See supra* note 181; *see also* Steven N. S. Cheung, *Property Rights in Trade Secrets*, 20 ECON. INQUIRY 40, 41, 44 (1982).

can manufacture competing products.[184] Because the task of reverse-engineering by honest means usually takes time and costs money, it gives subpatentable innovators a modicum of natural lead time in which to recuperate their investments and to establish their trademarks and brand names as symbols of quality.[185]

By the same token, the competitor's investment in reverse-engineering contributes indirectly to the relevant technical community's overall costs of research and development, and it usually issues in improvements (or lower priced goods) that advance the prevailing technical paradigms. Those competitors who find the task of reverse-engineering by proper means too difficult or too costly may, instead, license the innovator's secret know-how contractually. In that case, the licensee will contribute directly to the innovator's costs of research and development without, however, either contracting party's being able to prevent third parties from engaging in the task of reverse-engineering at their expense.[186] In either case, it is normally the judge-made rules determining what constitutes honest or proper means of reverse-engineering that enables courts to distinguish between free riders and fair followers for purposes of unfair competition law.[187]

By mandating worldwide protection of confidential information under similar regimes, the TRIPS Agreement[188] cre-

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184. *See, e.g.*, Uniform Trade Secrets Act sec. 1, 14 U.L.A. 438 (1985) [hereinafter UTSA] (adopted in most U.S. states); RESTATEMENT (THIRD) OF UNFAIR COMPETITION LAW sec. 38 cmt. b, secs. 39-45 (1996).

185. *See supra* notes 181 & 184 and accompanying text (discussing the policy rationale for protection of trade secrets). *See also* John C. Stedman, *Trade Secrets*, 23 OHIO ST. L.J. 4, 25 (1962); David D. Friedman et al., *Some Economics of Trade Secret Law*, J. ECON. PERSP., Winter 1991, at 61, 64.

186. *See generally* Reichman, *Legal Hybrids*, *supra* note 25, at 2438-41, 2521-25 (citing authorities).

187. *See, e.g.*, UTSA, *supra* note 184, sec. 1(4), 14 U.L.A. 438 (adopted by a majority of states); RESTATEMENT (THIRD) OF UNFAIR COMPETITION, *supra* note 184, secs. 39-45. "Trade secret law thus provides some incentive to develop the incremental innovation not meeting the nonobviousness standard of patent law, while it simultaneously discourages industrial espionage, unethical behavior and corruption." Reichman, *TRIPS and Developing Countries*, *supra* note 8, at 32 (citing authorities).

188. *See* TRIPS Agreement, *supra* note 1, art. 39(1) (incorporating by reference Paris Convention, *supra* note 10, art. 10*bis* (concerning protection against unfair competition)). *See also* Rudolf Krasser, *The Protection of Trade Secrets in the TRIPS Agreement*, *in* FROM GATT TO TRIPS — THE AGREEMENT ON

ates legal bases for stimulating investment in subpatentable innovation in all those countries, including the developing countries and former socialist countries, where unbridled free-riding heretofore threatened to undermine the innovator's incentives to invest.[189] When "unlicensed technology is transferred through self-help methods of reverse-engineering," moreover, it "roots the technology in the local culture, which provides a basis for future research and development."[190] The increasing availability of technical skills in the global labor market facilitates this endeavor. The protection of confidential information under the TRIPS Agreement also favors the licensing of more advanced technologies to the developing countries by reducing the licensor's risk aversion and perhaps some transaction costs, as well.[191]

However, Article 39(2) of the TRIPS Agreement, which otherwise tracks the Uniform Trade Secrets Act widely adopted in the United States,[192] fails expressly to state that third parties are allowed to reverse-engineer products made from secret processes by proper means.[193] This is unfortunate in view of the growing tendency in some European Union

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TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS 216, 216-22 (F.K. Beier & G. Schricker eds., 1996) (tracking the legislative history). The TRIPS Agreement is the first international convention that requires member countries to protect undisclosed information as such. "A systematic failure to provide either trade secret protection or equivalent laws governing confidential disclosures should thus become actionable as a distinct component of the international regime of unfair competition law that article 10*bis* of the Paris Convention already covers." Reichman, *Universal Minimum Standards*, *supra* note 6, at 378 (citing authorities).

189. Recent empirical research suggests that, even in the United States, less established firms tend to employ trade secrecy because of the high costs of patenting and that this protection is critical to small companies whose contribution to innovation may not fully be recognized. *See* Josh Lerner, THE IMPORTANCE OF TRADE SECRECY: EVIDENCE FROM CIVIL LITIGATION (Harvard Business School Working Paper No. 95-043, 1994).

190. Reichman, *Intellectual Property and the GATT*, *supra* note 8, at 63-64.

191. *See, e.g.*, Robert M. Sherwood, *A Microeconomic View of Intellectual Property Protection in Brazilian Development*, *in* INTELLECTUAL PROPERTY RIGHTS IN SCIENCE, TECHNOLOGY AND ECONOMIC PERFORMANCE 113, 116-29 (Francis W. Rushing & Carole Ganz Brown eds., 1990). *See also* Carlos M. Correa, *Legal Nature and Contractual Conditions in Know-How Transactions*, 11 GA. J. INT'L & COMP. L. 449, 452-54, 468 (1981).

192. *Compare* TRIPS Agreement, *supra* note 1, art. 39(2) *with* UTSA, *supra* note 184, sec. 1(4).

193. TRIPS Agreement, *supra* note 1, art. 39(2) states:

countries to stigmatize reverse-engineering as "parasitical copying."[194] The developing countries should, therefore, insist that the relevant TRIPS forums recognize that a competitor's right to reverse-engineer by proper means is inherent in "the honest commercial practices" standard applicable under both Article 39(2) and Article 10*bis* of the Paris Convention.[195] In so doing, they may remind any duly appointed WTO dispute-settlement panel that a failure to acknowledge the competitor's right to reverse-engineer would contradict the United States Supreme Court's long-standing precedents to this effect and would also compromise the economic functions of trade secret law itself.[196]

2. *Artificial Lead Time Under* Sui Generis *Intellectual Property Laws*

Even the best trade secret laws may not provide local investors in subpatentable innovation with adequate lead time,

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National and legal persons shall have the possibility of preventing information lawfully within their control from being disclosed to . . . or used by others without their consent *in a manner contrary to honest commercial practices* so long as such information

(a) is secret. . .

(b) has commercial value. . .

(c) has been subject to reasonable steps. . .to keep it secret.

TRIPS Agreement, *supra* note 1, art. 39(2) (emphasis added). A footnote clarifies only that "'a manner contrary to honest commercial practices' shall mean at least practices such as breach of contract, breach of confidence and inducement to breach . . . ." *Id.*, art. 39(2) n.10.

194. *See, e.g.*, Jean-Marc Mousseron, *La Protection du Savoire-Faire (Know-How), in* EXPORTING OUR TECHNOLOGY: INTERNATIONAL PROTECTION AND TRANSFERS OF INDUSTRIAL INNOVATIONS, 270-73 (Mistrale Goudreau et al. eds., 1995).

195. *See supra* notes 188 & 192; G.H.C. BODENHAUSEN, GUIDE TO THE APPLICATION OF THE PARIS CONVENTION FOR THE PROTECTION OF INDUSTRIAL PROPERTY AS REVISED AT STOCKHOLM IN 1967 142-46 (1968).

196. *See, e.g., Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 476, 490 (1974); *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 160 (1989); RESTATEMENT (THIRD) OF UNFAIR COMPETITION LAW sec. 38 cmt. b, secs. 39-45 (1996); Friedman et al., *supra* note 185, at 70. For the role that dispute settlement panels may have in deciding such questions, see generally Dreyfuss & Lowenfeld, *supra* note 62; Karen D. Lee and Silke von Lewinski, *The Settlement of International Disputes in the Field of Intellectual Property, in* FROM GATT TO TRIPS — THE AGREEMENT ON TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS 278, 305-07 (F.K. Beier & G. Schricker eds., 1996) ("Interpretation of the Covered Agreements").

however, if the innovators' know-how does not lend itself to secrecy. In the nineteenth century, for example, manufacturers found that they could seldom keep industrial designs secret, whether of a functional or an aesthetic nature, because the end results of the designers' skilled efforts became embodied on or near the face of mass-produced goods sold in the open market. By duplicating the publicly distributed designs, free-riders could appropriate the fruits of the innovators' investments without having to incur the costs of reverse-engineering the designers' original know-how.

Because neither patent nor copyright laws adequately protected these functional and aesthetic designs, some developed countries enacted *sui generis* utility model laws covering innovative handtool designs[197] or *sui generis* design laws to protect aesthetically pleasing product configurations (known today as "appearance designs").[198]

Such laws, built on modified patent or copyright principles, have proved unstable over time,[199] and the utility model laws of Germany, Italy, and Japan have uniformly degenerated into "petty patent" laws that protect less than nonobvious inventions generally, despite the contradictions this breeds with classical economic theories of patent protection.[200]

The market failure described above is best understood as a failure of classical trade secret laws (or related laws of confidential information) to provide investors in certain types of subpatentable innovation with a sufficient amount of natural

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197. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2455-59 (citing authorities).

198. See, e.g., Reichman, *Legal Hybrids*, *supra* note 25, at 2459-65 (citing authorities). *See generally* J.H. Reichman, *Design Protection in Domestic and Foreign Copyright Law: From the Berne Revision of 1948 to the Copyright Act of 1976*, 1983 DUKE L.J. 1143, 1153-58.

199. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2458-59, 2461-64; Reichman, *Electronic Information Tools*, *supra* note 118, at 451-55 ("Tool Design in Comparative Industrial Property Law"); *see generally* J.H. Reichman, *Design Protection After the Copyright Act of 1976: A Comparative View of the Emerging Interim Models*, 31 J. COPYRIGHT SOC'Y 267, 366-86 (1984).

200. *See supra* notes 197, 199 and accompanying text (citing sources that explain the legal and economic contradictions of utility model laws); *infra* note 237 and accompanying text. *See also* Rudolf Krasser, *Developments in Utility Model Law*, 26 I.I.C. 950, 955-62 (1995) (noting that of "all the categories of invention for which patent protection is available [in Germany], only process patents are now excluded from utility model protection").

lead time.[201] With the large-scale development of electronic information tools and other cutting-edge technologies in the late twentieth century (including biotechnology), this breakdown of classical trade secret law has become widespread,[202] with a corresponding disruption of the patent and copyright subsystems and of the international intellectual property system they undergird.[203] Given the market conditions associated with an "Information Age,"[204] in other words, "incremental innovation bearing know-how on its face" has become a pervasive problem for those who invest in developing the most valuable new technologies. Because novel, design-rich applications of subpatentable know-how to industry tend to obtain insufficient lead time under modern conditions, free-riders unrestrained by *sui generis* intellectual property regimes may appropriate the fruits of these investments without contributing, directly or indirectly, to the costs of research and development.[205]

This chronic shortage of natural lead time has induced the developed countries to multiply *sui generis* regimes of exclusive property rights for each new type of creation threatened with market failure. As noted earlier, *sui generis* design laws and utility model laws first arose in response to similar problems during the nineteenth century,[206] and proposals to expand and harmonize these regimes are pending before the legislative forums of the European Union.[207] More re-

201. *See, e.g.*, Reichman, *Legal Hybrids, supra* note 25, at 2506-19 ("Contraction of Lead Time in Design Dependent Technologies").

202. *See, e.g.*, Reichman, *Legal Hybrids, supra* note 25, at 2504-06 (citing authorities).

203. *See, e.g.*, Reichman, *Collapse of the Patent-Copyright Dichotomy, supra* note 26, at 496-520; *see also* Pamela Samuelson, *A Case Study on Computer Programs, in* GLOBAL DIMENSIONS OF INTELLECTUAL PROPERTY RIGHTS IN SCIENCE AND TECHNOLOGY 284, 288-304 (Mitchel B. Wallerstein et al. eds., 1993); Barton, *supra* note 37, at 256, 257-75.

204. *See, e.g.*, JAMES BOYLE, SHAMANS, SOFTWARE, AND SPLEENS: LAW AND THE CONSTITUTION OF THE INFORMATION SOCIETY 1-16 (1996).

205. *See, e.g.*, Reichman, *Legal Hybrids, supra* note 25, at 2506-19; Samuelson et al., *Manifesto, supra* note 25, at 2326-65.

206. *See supra* notes 197-200 and accompanying text (describing the development of *sui generis* design laws and utility model laws).

207. *See, e.g.*, E.C. Proposal of 3 Dec. 1993 for a European Parliament and Council Directive on the 'Community Design,' *in* SWEET & MAXWELL'S E.C. INTELLECTUAL PROPERTY MATERIALS 290-362 (Anna Boody & Audrey Horton eds., 1994); E.C. Amended Proposal for a European Parliament and Council

cently, similar phenomena have engendered similar responses with respect to computer programs,[208] biogenetic engineering,[209] integrated circuit designs,[210] plant varieties,[211] databases,[212] and numerous other innovations for which *sui generis* regimes of modified patent and copyright principles have either been devised or proposed.[213]

The developed countries, wisely or unwisely, have thus sought to address the chronic shortage of lead time under present-day conditions by a proliferation of hybrid exclusive property rights. They will logically press the developing coun-

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Directive on the legal protection of designs 96/C 142/05 COM (96) 66 final - COD 464, O.J. E.C. No. C142/7, May 14, 1996; E.C. Green Paper on Utility Models, *supra* note 21 and accompanying text.

208. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2481-83 (discussing the *sui generis* French law governing computer programs, enacted in 1985). Much of this law was destined to be superseded by the E.C. Directive on the Legal Protection of Computer Programs, *supra* note 20, which purports to apply copyright law to computer software. However, to the extent that the E.C. software directive significantly modifies the traditional rules of copyright law, it also operates as a de facto *sui generis* law. *See also* Samuelson, *supra* note 203 and accompanying text; Reichman, *Legal Hybrids*, *supra* note 25, at 2484-88.

209. *See, e.g.*, Proposed E.C. Directive on the Legal Protection of Biotechnological Inventions, *supra* note 20 and accompanying text; Barton, *supra* note 37, at 261 (proposed Directive on Biotechnology "amounts to *sui generis* protection for biotechnology" because it would establish numerous specific rules that deviate from standard patent law doctrines).

210. *See* TRIPS Agreement, *supra* note 1, arts. 35-38. "In effect, the TRIPS Agreement mandates compliance with core substantive provisions of the Treaty on Intellectual Property in Respect of Integrated Circuits of 1989 (I.P.I.C. Treaty), which, not surprisingly, embody the spirit if not always the practice of the U.S. Semiconductor Chip Protection Act of 1984 (S.C.P.A.)." Reichman, *Universal Minimum Standards*, *supra* note 6, at 374 (citing authorities).

211. *See* UPOV 1991, *supra* note 92 (substantially revising International Convention for the Protection of New Varieties of Plants, Dec. 2, 1961, 33 U.S.T. 2703, 815 U.N.T.S. 89 [hereinafter UPOV 1961]); Plant Variety Protection Act, Pub. L. No. 91-577, 84 Stat. 1542 (1970) (codified as amended at 7 U.S.C. secs. 2321-2583 (1994)); *see also* Reichman, *Legal Hybrids*, *supra* note 25, at 2465-72.

212. *See* E.C. Directive on Databases, *supra* note 21; H.R. 3531, *supra* note 21; Reichman & Samuelson, *Intellectual Property Rights in Data?*, *supra* note 24.

213. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2472-76 (discussing Swiss and Japanese statutes protecting new technology in unfair competition law), 2477-78 (discussing the *sui generis* protection of technical drawings and engineering projects in Italian law), 2488-90 (discussing the protection of industrial designs in some copyright laws).

tries to follow suit, with a view to maintaining their comparative advantages in the respective fields of endeavor. The TRIPS Agreement already manifests these pressures by prescribing detailed *sui generis* measures for integrated circuit designs,[214] by laying down somewhat more flexible guidelines for the protection of industrial designs,[215] and by indicating a preference for a modified patent approach to plant varieties.[216] As the process of harmonizing the intellectual property laws of the developed countries further unfolds,[217] the pressures on developing countries seem likely to increase, most immediately with regard to electronic databases.[218]

In fashioning their responses to these pressures, wary developing countries may find it expedient to adopt a more competitive approach than those of the existing *sui generis* regimes favored by the developed countries. It is true that, to some extent, developing countries will share some of the same problems in protecting small-scale innovations as their more developed counterparts and that they stand to benefit from some of the same solutions.[219] This is the rationale underlying the numerous recommendations urging the developing coun-

214. *See supra* note 210.

215. *See* TRIPS Agreement, *supra* note 1, arts. 25-26; Annette Kur, *TRIPS and Design Protection, in* FROM GATT TO TRIPS — THE AGREEMENT ON TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS 141, 148-59 (F.K. Beier & G. Schricker eds., 1996). *See also* Reichman, *Universal Minimum Standards, supra* note 6, at 375-77 (noting possible nonconformity of U.S. design patent law with these TRIPS standards).

216. *See* TRIPS Agreement, *supra* note 1, art. 27(b) (stating that "members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof"); *supra* note 211 and accompanying text; *see also* S.K. Verma, *TRIPS and Plant Variety Protection in Developing Countries*, 17 E.I.P.R. 281 (1995). The 1991 amendments transformed the 1978 text of UPOV from a modified copyright approach to a modified patent approach. *See supra* note 211; Reichman, *Legal Hybrids, supra* note 25, at 2467-72.

217. *See, e.g.*, Thomas C. Vinje, *Harmonising Intellectual Property Laws in the European Union: Past, Present, and Future*, 17 E.I.P.R. 361 (1995); *supra* notes 20-21.

218. *See supra* notes 15-15 & 212 and accompanying text; Reichman & Samuelson, *supra* note 24, at 95-102, 109-113.

219. *See, e.g.*, Gana, *supra* note 8, at 757-59.

tries to adopt utility model laws.[220] The positive experience of Japan in this regard supports such a thesis.[221]

Nevertheless, this investigator believes that the developing countries would benefit most from a different type of intellectual property regime, built on modified liability principles, to encourage subpatentable innovation.[222] Such a regime could solve the underlying problem of market failure without instituting exclusive property rights that may inflict more social harm than benefits due to their cumulative restraints on trade.[223]

3. *A General Purpose Innovation Law on Modified Liability Principles*

On the one hand, most of the modified patent and copyright regimes have proved unstable over time. This instability largely results from an inherent tendency to produce chronic states of under- and over-protection.[224] Arguably, the creation of mini-monopolies to stimulate investment in routine innovation that firms would undertake in their own interest, if undeterred by an appropriability problem, is overprotective on its face.[225] Despite some two hundred years of experimenta-

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220. *See, e.g.*, Robert E. Evenson, *Survey of Empirical Studies, in* STRENGTHENING PROTECTION OF INTELLECTUAL PROPERTY IN DEVELOPING COUNTRIES—A SURVEY OF THE LITERATURE 33, 41-42 (Wolfgang E. Siebeck ed., 1990); Hanns Ullrich, *GATT: Industrial Property Protection, Fair Trade and Development, in* GATT OR WIPO? NEW WAYS IN THE INTERNATIONAL PROTECTION OF INTELLECTUAL PROPERTY 126, 153-55 (F.K. Beier & G. Schricker eds., 1989); Reichman, *TRIPS and Developing Countries*, *supra* note 8, at 39. For the recent spread of utility models to many countries, including developing countries, see Krasser, *supra* note 200, at 956-58.

221. *See, e.g.*, Shoji Matsui, *The Transfer of Technology to Developing Countries: Some Proposals to Solve Current Problems*, 59 J. PAT. OFF. SOC'Y 612 (1977).

222. *See, e.g.*, Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972); *see generally* Reichman, *Legal Hybrids*, *supra* note 25, at 2438-48.

223. *See, e.g.*, Reichman, *Competition Law, Intellectual Property, and Trade*, *supra* note 26, at 87-98.

224. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2459 (evolution of utility model laws), 2459-64 (recurring cycles of under- and over-protection of registered designs during two-hundred year period), 2465-72 (tracing shift of UPOV protection for plant varieties from modified copyright principles in 1961 version to modified patent principles in 1991 version).

225. *See, e.g.*, Gustavo Ghidini, *Prospettive "protezioniste" nel diritto industriale*, 1995 RIVISTA DI DIRITTO INDUSTRIALE 73, 73-95. If the justification of the

tion with such regimes, moreover, neither legal and economic theory nor empirical analysis have mustered any consensus concerning one single *sui generis* model that could suitably be applied to either new or old technologies.[226] The most one can say is that, in some instances, these regimes have provided needed incentives that were not otherwise available, even if they lead to socially costly monopolies and other barriers to entry.[227]

On the other hand, there is growing interest in attempts to stimulate investment in subpatentable innovation by resort to liability regimes that do not create exclusive property rights or legal barriers to entry.[228] One developed country, Italy, has long protected engineering projects and technical drawings under a modified liability regime that has been remarkably sta-

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patent paradigm is that it stimulates nonobvious inventions that would not otherwise have been made (and does so with a relative degree of efficiency), the justification of similar incentives for obvious innovations that would be discovered in due course is hard to envision. *See, e.g.*, Oddi, *TRIPS*, *supra* note 14, at 440-42 (surveying economic literature). *See also* Reichman, *Collapse of the Patent-Copyright Dichotomy*, *supra* note 26, at 485-89 (discussing negative economic premises of patent paradigm), 512-17 (finding that the hybrid regimes of exclusive property rights override these negative economic premises and that they "suspend the operation of the normal rules of competition at the very core of the post-industrial economy").

226. *See, e.g.*, J.H. Reichman, *Design Protection and the New Technologies: The United States Experience in a Transnational Perspective*, 19 U. BALT. L. REV. 6, 265-74 (1989) [hereinafter Reichman, *Designs and New Technologies*]; Reichman, *Electronic Information Tools*, *supra* note 118, at 446-68. The European Commission recently proposed to harmonize European Union law around four distinct layers of design protection that include registered design rights, unregistered design rights, copyright protection of industrial designs, and utility model laws to protect functional designs. *See supra* notes 20-21. During a seventy-year period in which France has offered the strongest known form of legal protection for industrial designs and Italy has offered the weakest legal regime short of unbridled free-riding, the Italian design industries have progressively increased their position in the world market, while the position of the French design industries has declined.

227. *See, e.g.*, Barton, *supra* note 37, at 271-75, 279.

228. For example, Japan and Switzerland have recently sought to provide investors in subpatentable innovation with a period of artificial lead time by making slavish imitation an act of unfair competition in specified circumstances. *See* Reichman, *Legal Hybrids*, *supra* note 25, at 2472-76 (citing authorities). *Cf.* Gordon, *On Owning Information*, *supra* note 30 (proposing tort of malcompetitive copying); *infra* note 241 and accompanying text (discussing certain liability-like features of the regime protecting integrated circuit designs).

ble over time.[229] In a larger perspective, this author's previous articles argue that a general purpose innovation law built on modified liability principles would stimulate sufficient investment in subpatentable applications of know-how to industry without the social costs of hybrid exclusive property rights and without even costlier extensions of the patent and copyright paradigms beyond their historical boundaries.[230]

In its simplest form, the proposed regime emulates the same economic functions that trade secret laws used to perform under optimal conditions without subjecting novel compilations of applied know-how to any requirement of actual or legal secrecy.[231] First, it would provide innovators with a very short period of artificial lead time in which to recoup their investments and associate their reputations for quality with recognizable trademarks. During this short but critical "blocking" period, second-comers could not market products that were substantially identical in whole or significant part to those protected by the regime.[232] Second, the proposed innovation law would establish a second, relatively short period of legal liability, during which second-comers could freely use novel, registered "industrial compilations" of subpatentable know-how under an automatic license that required them to pay established user fees for this purpose. Third, a general purpose innovation law on modified liability principles would establish specific guidelines for fair and equitable licensing of registered compilations of know-how as a built-in condition of liability protection itself. Thus, voluntary licenses tracking the

229. *See* Italian Copyright Law, Law No. 633 of April 22, 1941, *as amended* through July 29, 1989, art. 99, *codified as* Codice Civile sec. 2578, *reprinted in* CODICE DEL COPYRIGHT — IL DIRITTO D'AUTORE FRA ARTE E INDUSTRIA 7 (Gustavo Ghidini ed., 1995) (affording creators of novel, registered engineering projects (or analogous productions that provide novel solutions to technical problems) "equitable compensation" for unauthorized commercial applications by third parties for a twenty year period); Ghidini, *supra* note 225, at 97-98; Reichman, *Legal Hybrids*, *supra* note 25, at 2477-78 (citing authorities).

230. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2519-57 ("Portable Trade Secrets"); Reichman, *Collapse of the Patent-Copyright Dichotomy*, *supra* note 26, at 517-20. *See also* Samuelson et al., *Manifesto*, *supra* note 25, at 2405-20.

231. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2520-29.

232. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2533-39, 2544-48; Samuelson et al., *Manifesto*, *supra* note 25, at 2413-14.

automatic licenses available under the default rules could safely adhere to these same conditions without risk of violating local competition laws.[233] Finally, such a regime would logically stimulate the establishment of collection societies (*i.e.*, extended licensing organizations) to collect royalties, issue the blanket licenses, and otherwise mediate between the shifting interests of innovators, borrowers, and the public at large.[234]

Although no fully constructed liability regime along these lines exists at the present time, a partial model exists in Article 99 of the Italian copyright law, which protects novel, registered designs of engineering projects and other technical designs for a period of twenty years.[235] During this period, second-comers can make any use whatsoever of a deposited engineering project, in whole or in part, provided that the user pays the originator a royalty based on the value added to the second project by the component borrowed from the protected pro-

233. An established menu of liability options would enable second-comers quickly to gain access to registered, subpatentable innovation, and originators would be compensated to the extent that their successes stimulated these second-comers to make further applications of their technical contributions to new and probably improved products. *See generally* Reichman, *Legal Hybrids*, *supra* note 25, at 2539-47, 2548-55; Samuelson et al., *Manifesto*, *supra* note 25, at 2414-15, 2418-29. In practice, the system presupposes that most transactions would occur under voluntary licenses at better than statutory rates within the framework of a collection society (*i.e.*, an extended licensing organization). *See infra* note 234 and accompanying text; *see also* Reichman & Samuelson, *supra* note 24, at 146-50 (discussing use of such an organization under a *sui generis* database regime on modified liability principles). Something like this already occurs under the compulsory license for mechanical recordings, established by the United States Copyright Act of 1976, 17 U.S.C. sec. 115 (1994), which has given rise to the vast system of private licenses administered by the Harry Fox Agency. *See, e.g.*, KRASILOVSKY & SHEMEL, THIS BUSINESS OF MUSIC 242-43 (1995) (noting that "this agency issued over 100,000 [voluntary] mechanical licenses in 1989, in contrast with the issuance of less than 50 compulsory licenses . . . during the same period"). Within such a framework, the menu of liability options may offer more nuanced features. For example, it may allow competitors that make substantial improvements or that operate on distant markets to avoid the "blocking period" while nonetheless obliging them to pay specific user fees for their uses. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2539-44; Samuelson et al., *Manifesto*, *supra* note 25, at 2418-20.

234. *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2555-57.

235. *See supra* note 229; Mario Fabiani, *Italy*, *in* INTERNATIONAL COPYRIGHT LAW AND PRACTICE secs. 3[2][g], 8[d][vi] (Paul Edward Geller ed., 1996).

ject.[236] While this regime lasts too long and provides no blocking period against "clones," it has proved remarkably stable over time in contrast with, say, design protection laws or utility model laws built on modified patent and copyright principles, which continue to manifest recurring cycles of under- and over-protection.[237]

These findings suggest that developing countries could stimulate more local innovation with fewer social costs by fashioning a tailor-made innovation law on modified liability principles than by emulating the hybrid regimes of exclusive property rights proliferating in the developed countries. Even the little-known liability regime used to protect registered engineering projects in Italy, despite its shortcomings, would overcome market failure with significantly fewer anti-competitive effects if extended to other forms of subpatentable innovation than those regimes,[238] owing to its inability to generate legal barriers to entry.[239]

As a practical matter, however, the TRIPS Agreement does not leave developing countries an entirely free hand in this regard. For example, Articles 35-38 require all signatories to adopt a *sui generis* regime for the protection of integrated circuit designs that tracks the United States Semiconductor Chip Protection Act of 1984.[240] Yet, even this regime incorpo-

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236. *See supra* note 229; Ghidini, *supra* note 225, at 97-98.

237. *See supra* notes 224-227 and accompanying text. For the legal and economic shortcomings of utility model regimes, see, e.g., FRANÇOIS PERRET, L'AUTONOMIE DU REGIME DE PROTECTION DES DESSINS ET MODÈLES 188-95, 231-33 (1974); Marie-Angèle Pérot-Morel, *L'Ambiguité du concept de modèle d'utilité, in* ETUDES EN L'HONNEUR DE R. FRANCESCHELLI 425 (1983). Even those experts that like utility models concede that there is no consensus for purposes of harmonization concerning the subject matter of protection, the criteria of eligibility, or the scope of protection. *See, e.g.*, Krasser, *supra* note 200, at 952-63. In its short lifetime, the hybrid exclusive rights regime to protect plant varieties has already evolved from modified copyright principles (i.e., chronic under-protection) to modified patent principles (i.e., chronic over-protection). *See, e.g.*, Reichman, *Legal Hybrids*, *supra* note 25, at 2467-72 (discussing UPOV 1961, *supra* note 211, and UPOV 1991, *supra* note 92).

238. *Accord* Ghidini, *supra* note 225, at 97-98.

239. *See, e.g.*, Harold Demsetz, *Barriers to Entry*, 72 AMER. ECON. REV. 47, 51-52, 56-57 (1982).

240. *See supra* note 210 and accompanying text; Semiconductor Chip Protection Act of 1984, Pub. L. No. 98-620, 98 Stat. 3335, 3347 (*codified as amended* at 17 U.S.C. secs. 901-914 (1994)).

rates a rudimentary liability principle that permits firms everywhere to reverse-engineer protected chip designs for purposes of analytical use. Such use remains non-infringing if it enables competing firms to create their own chip designs without simply duplicating the protected designs.[241] Although the developing countries otherwise face formidable technical barriers to entry into this field,[242] the TRIPS Agreement itself creates no serious legal barriers to entry, other than to prevent governments in these countries from alleviating their knowledge gap by directly resorting to compulsory licenses.[243]

Because the TRIPS Agreement leaves developing countries more leeway with respect to other forms of subpatentable innovation, their governments will have some difficult and important choices to make. For example, the provisions that loosely cover both industrial designs and plant varieties[244] can be construed to permit developing countries either to emulate the hybrid regimes of exclusive property rights practiced in developed countries or to experiment with tailor-made regimes more likely to promote local interests, including the modified

241. *See* TRIPS Agreement, *supra* note 1, art. 35, incorporating by reference IPIC Treaty, *supra* note 10, arts. 6(1)(i), 6(2). The laws protecting integrated circuit designs thus preserve an innovator's lead time as against wholesale copying, while stimulating second-comers to shorten that lead time by means of reverse-engineering and the improvements to which it leads. *See, e.g.*, Brooktree Corp. v. Advanced Micro Devices, Inc., 977 F. 2d 1555, 1565, 1569-70 (Fed. Cir. 1992); Leo J. Raskind, *Reverse Engineering, Unfair Competition, and Fair Use*, 70 MINN. L. REV. 385, 402 (1985); Reichman, *Overlapping Proprietary Rights*, *supra* note 142, at 110-16 (citing authorities).

242. "The increased complexity of chip designs in recent years, the correspondingly higher costs of development and production, and the increasingly incestuous relations between purchasers and manufacturers all tend to limit the prospects for developing countries in this field." Reichman, *TRIPS and Developing Countries*, *supra* note 8, at 37 (citing authorities). Nevertheless, some newly industrialized countries are making inroads on the market. *See, e.g.*, Carlos M. Correa, *Intellectual Property in the Field of Integrated Circuits: Implications for Developing Countries*, 14 WORLD COMPETITION L. & ECON. REV. 83, 84-86 (1990).

243. *See* TRIPS Agreement, *supra* note 1, arts. 31(c), 35 (overriding contrary provisions in IPIC Treaty, *supra* note 10); Reichman, *Universal Minimum Standards*, *supra* note 6, at 374-75. However, compulsory licenses for abuse of intellectual property rights in particular, or of a dominant position in general, could still be applied. *See* TRIPS Agreement, *supra* note 1, arts. 8, 40; *supra* text accompanying notes 165-180.

244. *See* TRIPS Agreement, *supra* note 1, arts. 25-26, 27(3)(b). National treatment must, however, be respected in any case. *See supra* note 54.

liability regimes discussed above.[245] With regard to plant varieties, in particular, the evidence suggests that the existing UPOV framework, as amended in 1991, strongly favors multinational firms over local breeders.[246] Besides correcting this imbalance, a tailor-made regime for developing countries should also take long-term economic and ecological factors into consideration by promoting the conservation of biodiversity and by ensuring that foreign firms exploiting local gene plasm do not disregard the specific needs of the host countries.[247]

The developing countries will have an even broader range of choices with respect to subpatentable technologies that the TRIPS Agreement does not expressly cover, such as functional designs and utility models, electronic databases, non-copyrightable components of computer programs, nonpatentable products of biogenetic engineering (other than plant vari-

245. As regards industrial designs, the TRIPS Agreement clearly favors a regime of exclusive property rights lasting at least ten years, and it limits the test of eligibility to designs that are "new or original." *See* TRIPS Agreement, *supra* note 1, arts. 25(1), 26. Nevertheless, the lack of consensus is such that only protection against copying is required, *id.*, art. 26(1), and there are grounds for arguing that compensated automatic licensing would be allowed late in the term, as currently occurs under the United Kingdom's unregistered design right. *Cf., id.*, art. 26(2); Peter Groves, COPYRIGHT AND DESIGNS LAW—A QUESTION OF BALANCE 301-02 (1991); W.B. CORNISH, INTELLECTUAL PROPERTY: PATENTS, COPYRIGHT, TRADEMARKS, AND ALLIED RIGHTS 503-04 (3d ed. 1996). While the European Union's proposed shift to an ultra-strong form of design protection could complicate the developing countries' ability to construe articles 25-26 of the TRIPS Agreement, it should not be dispositive on the merits. As regards plant varieties, art. 27(3)(b) of the TRIPS Agreement requires that developing countries provide "an effective *sui generis* system" in the absence of patents, but "the developing countries are not obliged to adopt the *sui generis* system of the UPOV Convention." Verma, *supra* note 216, at 289.

246. *See supra* notes 92 & 211 and accompanying text. *See also* Straus, *Implications, supra* note 57, at 185-86 (noting advantages for developing countries that adhere to 1978 text of UPOV, rather than 1991 version, and conceding that these countries may "decide to create *sui generis* protection according to their own concepts"); Verma, *supra* note 216, at 283-89. For the characteristics of UPOV 1991, *see supra* note 92.

247. *See, e.g.*, Verma, *supra* note 216, at 283-89. *See also* Walden, *supra* note 101, at 176-97; Mohamed Kalil, *Biodiversity and the Conservation of Medicinal Plants: Issues from the Perspective of the Developing World*, *in* INTELLECTUAL PROPERTY RIGHTS AND BIODIVERSITY CONSERVATION 232-53 (T. Swanson ed., 1995); Bosselmann, *supra* note 98.

eties), and still other cutting-edge applications of know-how to industry.[248] One choice available to the developing countries is to allow local firms to engage in free-riding duplication whenever legally permitted. A second option is to emulate the hybrid regimes of exclusive property rights favored by the developed countries. Finally, developing countries may choose to devise *sui generis* regimes according to their own concepts, including a general purpose innovation law built upon liability principles for applications of technical know-how to industry that trade secret laws cannot otherwise protect. In this connection, policymakers should note that the third option might escape international regulation altogether, including even the pervasive national treatment requirements of the TRIPS Agreement, at least with respect to subject matters not covered by the Paris and Berne Conventions.[249]

The developing countries could thus conceivably outflank protectionist circles in developed countries by instituting procompetitive, market-driven liability regimes that favored local communities of innovators. To the extent that subpatentable innovation originating from developed countries was legitimately denied access to local innovation laws for at least a transitional decade or two, the prospects for using liability regimes to accelerate the diffusion of technical knowledge might be potentiated many times over. However, a discriminatory policy could discourage some voluntary transfers of subpatentable technology from developed countries, and these social costs must be taken into account.

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248. Although these subject matters generally fall outside the "intellectual property" expressly covered by the TRIPS Agreement [except insofar as they constitute trade secrets, *supra* notes 10 & 188 and accompanying text], the residual provisions of the Paris and Berne Conventions may sometimes apply. *See* TRIPS Agreement, *supra* note 1, arts. 1(2), 2-4, 9(1); Reichman, *Universal Minimum Standards*, *supra* note 6, at 347-51. In the case of utility models, for example, the Paris Convention lays down some minimum standards concerning priority, in addition to requiring national treatment. *See, e.g.*, Paris Convention, *supra* note 10, arts. 1(2), (3), 2(1), 4(A)(1).

249. *See supra* notes 10, 54 & 243 (national treatment after TRIPS Agreement).

D. *Resisting the Drive for Stronger International Intellectual Property Rights*

For the foreseeable future, the developed countries seem determined to further elevate existing intellectual property norms in their domestic laws, to adopt new *sui generis* regimes of exclusive property rights (or to otherwise strengthen existing *sui generis* regimes), and to harmonize the resulting trade barriers among themselves.[250] Driving this protectionist trend is a relatively small group of powerful interests who show little concern for the long-term anti-competitive effects of such measures on their own domestic economies, let alone on the developing countries that are often identified as the principle targets.[251]

Here, however, the trade paradigm that was successfully used to engineer an exchange of greater market access for stronger intellectual property rights during the Uruguay Round cuts both ways. Even though the TRIPS Agreement was primarily aimed at the newly industrialized countries, its international minimum standards will apply to all developing countries without affording them any offsetting preferential measures,[252] other than the right to delay implementation for a few years longer than the developed countries. The sole exception was for LDCs, which may petition for further waivers from the duty of full compliance on a showing of hardship even after a ten-year transitional period.[253]

The gradual commitment of all developing countries to standards of protection that in some cases exceeded even

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250. *See supra* text accompanying notes 12-29 (illustrating these propositions and citing authorities).

251. *See, e.g.*, Oddi, *TRIPS*, *supra* note 14, at 455, 469 (criticizing "international trade policy . . . driven by industry groups even to the extent of special interest protection for preeminent members of such groups"); Gana, *supra* note 8, at 775 (stating that the "willingness of developing countries to comply with WTO decisions" may depend, in part, on the extent to which "the TRIPS Agreement is interpreted to permit development objectives to be meaningfully implemented;" and wondering if TRIPS may not become the Achilles heel of the world's trading system). *See also* Ullrich, *supra* note 220, at 138-42, 146-56.

252. *See, e.g.*, Ullrich, *supra* note 220, at 149-50; *see generally* Reichman, *GATT Connection*, *supra* note 3, at 816-27, 862-75 (contrasting dualist treatment of developing countries under prior international law, including both trade and certain intellectual property laws).

253. *See supra* note 7.

those prevailing in many developed countries should reinforce the comparative advantages of the technology exporting countries, at least for the short and medium terms.[254] If the developing countries nonetheless signed onto a rather one-sided deal, it was partly because the trade concessions offered them in other areas, notably agriculture and textiles, appeared to provide offsetting compensatory benefits.[255]

The "package deal" written into the Final Act of the Uruguay Round, which required all signatory countries to accept the end results as a whole, without conditions or exceptions, thus supplied the economic logic needed to break the previous impasse in international intellectual property negotiations conducted under the aegis of the WIPO.[256] By the same token, the developed countries cannot now simply return to WIPO and resume their pressures for still higher levels of in-

254. *See, e.g.*, Ullrich, *supra* note 220, at 151 (stating that to "requir[e]. . . high levels of industrial property protection from these countries amounts to no less than the attempt to bring back and to reserve to industrialized countries what they consider to be 'their' technologies."). *See also* Carlos A. Primo Braga, *Trade-Related Intellectual Property Issues: The Uruguay Round Agreement and Its Economic Implications*, paper presented to the World Bank Conference on the Uruguay Round and the Developing Economies 50 (Jan. 26-27, 1995) (finding that "negative welfare implications for developing countries are . . . diluted by . . . transitional periods" and that stronger intellectual property rights would yield long-term "positive sum gains" with respect to trade, foreign direct investment, and transfer of technology").

255. *See, e.g.*, Richard Blakehurst et al., *The Uruguay Round and Market Access: Opportunities and Challenges for Developing Countries*, paper presented to the World Bank Conference on the Uruguay Round and the Developing Economies (Jan. 26-27, 1995); Ian Goldin & Dominique van der Mensbrugghe, *The Uruguay Round: An Assessment of Economy-Wide and Agricultural Reforms*, paper presented to the World Bank Conference, *supra*; *see also* Merlinda D. Ingco, *Agricultural Trade Liberalization in the Uruguay Round: One Step Forward, One Step Back?*, paper presented to the World Bank Conference, *supra*, at 53 (finding that "while significant reforms in the rules were achieved, the extent of liberalization and the degree of reduction in agricultural protection will be significantly less than expected"). The developing countries also bargained for freedom from unilateral intellectual property pressures falling outside the WTO machinery. *See, e.g.*, Reichman, *Universal Minimum Standards*, *supra* note 6, at 382-88. *See also* JOHN H. JACKSON, THE WORLD TRADING SYSTEM: LAW AND POLICY OF INTERNATIONAL ECONOMIC RELATIONS 109-13, 275-78 (1989).

256. *See* Final Act, *supra* note 1, art. 4 ("The representatives agree that the WTO Agreement shall be open for acceptance as a whole. . . by all participants pursuant to Article XIV thereof"); *see also* Dryfuss & Lowenfeld, *supra* note 62; Reichman, *Intellectual Property and the GATT*, *supra* note 8, at 8-12.

tellectual property protection as if nothing had happened in the interim. Nor can they jettison the logic of the multilateral trade negotiations, which requires participants to bargain for reciprocal concessions leading to potential win-win outcomes for all concerned, merely because they lack the domestic political will to fashion additional concessions.

As matters stand, most developing countries have little need for higher intellectual property standards. They have, therefore, no reason to endorse the results of negotiations leading to still higher standards of protection among the developed countries (unless their interests are expressly taken into account)[257] and every reason to maintain a competitive position with respect to those countries. The developing countries should, therefore, skeptically monitor each new set of demands, with a view to evaluating their long term anti-competitive effects on both consumers and innovators everywhere.[258]

In principle, unless greater market access or other trade concessions are offered in exchange, the developing countries should opt out of further attempts to add to or enhance existing international minimum standards of intellectual property protection, at least until the true social costs and benefits of the Uruguay Round have been empirically evaluated. If this causes disgruntled developed countries to resort to unilateral trade sanctions to force unresolved issues, notwithstanding the obligation to forego such measures under the WTO Agreement,[259] then the developing countries can retaliate by cutting

257. *See* Monique L. Cordray, *GATT v. WIPO*, 76 J. PAT. TRADEMARK OFF. SOC'Y 121 (1994) (discussing WIPO's proposed Patent Law Treaty). The developing countries successfully defended their interests at the WIPO Diplomatic Conference on Certain Copyright and Neighboring Rights Questions, held at Geneva, Switzerland, Dec. 2-20, 1996, and the two treaties it produced (*see supra* note 18) reflect a balance of public and private interests as a result. *See, e.g.*, Samuelson, *supra* note 15.

258. For the legal framework in which such demands may arise, see, e.g., TRIPS Agreement, *supra* note 1, art. 71, which authorizes the Council for TRIPS, established in Article 68, to "undertake reviews in the light of any relevant new developments which might warrant modification or amendment of this Agreement." *See also* Reichman, *Universal Minimum Standards*, *supra* note 6, at 383-85.

259. *See* TRIPS Agreement, *supra* note 1, art. 64(1), incorporating by reference WTO Agreement, *supra* note 1, Annex 2: Understanding on Rules and Procedures Governing the Settlement of Disputes, *reprinted in*, THE RESULTS

back upon their own commitments under the TRIPS Agreement.[260] In the meanwhile, by scrupulously implementing these same commitments, the developing countries can subtly dissuade the developed countries from creating new sources of friction that could jeopardize their previous gains under this Agreement.

E. *Strengthening National Infrastructures for the Acquisition and Dissemination of Scientific and Technical Knowledge*

While developing countries lag behind developed countries with respect to the institutional infrastructures needed to promote technological innovation, the former also possess some unique opportunities. Their national systems of innovation are still in the process of formation and may, therefore, more easily accommodate certain rationalization policies than countries with highly developed institutional frameworks. Historically, for example, a country that concentrated on basic research at an early period, such as the United Kingdom, may prove less successful at merging investment in basic research with opportunities for significant applications to industry. Countries like Japan, that target selected market segments for new technologies, may outperform the very developed countries responsible for the underlying scientific breakthroughs owing to a combination of lower labor costs and greater flexibility in responding to innovative opportunities.[261]

Each developing country, viewing the cluster of institutions, policies and laws of its more developed competitors, is challenged to identify that mix of policies and strategies most

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OF THE URUGUAY ROUND OF MULTILATERAL TRADE NEGOTIATIONS: THE LEGAL TEXTS 2-3 art. 23 ("Strengthening of the Multilateral System") (GATT Secretariat ed., 1994). *See also* Judith H. Bello & Allan F. Holmer, *GATT Dispute Settlement Agreement: Internationalization or Elimination of Section 301?*, 26 INT'L LAW. 795, 800-01 (1992).

260. *Cf.* Hans Peter Kunz-Hallstein, *The United States Proposal for a GATT Agreement on Intellectual Property and the Paris Convention for the Protection of Industrial Property*, 22 VAND. J. TRANSNAT'L L. 265, 278-82 (1989) (stressing under-used role of retaliation in international intellectual property disputes).

261. *See, e.g.*, Dwight H. Perkins, *Economic Systems Reform in Developing Countries*, *in* REFORMING ECONOMIC SYSTEMS IN DEVELOPING COUNTRIES 11, 28-29 (D.H. Perkins & M. Roemer eds., 1991).

likely to increase national competitiveness in an increasingly competitive world market.[262]

1. *Relating Intellectual Property Rights to Other Rationalizing Factors*

The process of rationalizing national systems of innovation necessarily subsumes intellectual property rights, antitrust or competition laws, and other legal regimes that stimulate innovative activity within the larger context of a given country's industrial and economic policies.[263] "As convincingly demonstrated by the booming industrial late-comers, the state is a key actor in the creation of dynamic comparative advantages . . . [and its] role includes the active promotion of technological change and its diffusion in the productive structure."[264] Yet, if the capacity of some states to improve the international competitiveness of their domestic economies has become clear, others can intervene too forcefully and thereby skew their economies in ways that ultimately limit private energies and investment and that also endow the system with socially harmful biases and incentives. There is always a risk that beyond providing infrastructure and an educated work force, misdirected government intervention may waste precious resources.[265]

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262. *See generally* Tyler S. Biggs & Brian D. Levy, *Strategic Interventions and the Political Economy of Industrial Policy in Developing Countries, in* REFORMING ECONOMIC SYSTEMS IN DEVELOPING COUNTRIES 365-96 (D.H. Perkins & M. Roemer eds., 1991).

263. *See, e.g.*, LEYDEN & LINK, *supra* note 12, at 2 (identifying government's role with intellectual property rights and the relaxation of antitrust constraints as conducive to private-sector innovative activity and with a variety of stimuli, ranging from subsidies and government grants to targeted tax incentives, which influence the direction of innovative activity in socially desirable ways); Christopher Freeman, *Technology Gaps, International Trade, and the Problems of Smaller and Less-Developed Economies, in* SMALL COUNTRIES FACING THE TECHNOLOGICAL REVOLUTION 67-82 (C. Freeman & B.A. Lundvall eds., 1988) (stressing the role of national systems of innovation in linking specialized local knowledge to technical capabilities).

264. Jorge Niosi & Philippe Faucher, *The State and International Trade: Technology and Competitiveness, in* TECHNOLOGY AND NATIONAL COMPETITIVENESS: OLIGOPOLY, TECHNOLOGICAL INNOVATION, AND INTERNATIONAL COMPETITION 119-20 (J. Niosi ed., 1991). *See also* Biggs & Levy, *supra* note 262, at 367-88 (analyzing industrial strategies of Korea and Taiwan).

265. For a novel analysis of successful government strategies, see HILTON L. ROOT, SMALL COUNTRIES, BIG LESSONS—GOVERNANCE AND THE RISE OF

When seeking to devise the right set of policies, decision-makers are confronted by at least two constant, interrelated factors that can significantly affect the powers of developing countries to catch up with or even surpass the technical capabilities of developed countries.[266] One is the greater path dependence of those at work on existing technological paradigms in developed countries and the risks of locked-in development this breeds (whereas path dependence in developing countries is usually more cultural than technological).[267]

The other is the growing potential for rapid international diffusion of scientific and technical knowledge. This has become a "crucial ingredient" in overcoming technological "lock-out" and in focusing attention on opportunities for leapfrogging that are temporarily obfuscated by path dependence in more developed countries.[268]

Measures that increase the relevant local communities' direct access to the world's cumulative store of technical knowledge in the cheapest, most efficient manner are thus of pri-

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EAST ASIA 1-18, 145-78 (Oxford Univ. Press, 1996). *See also* Niosi & Faucher, *supra* note 264, at 119-20, 125, 133 (stressing need for governments to create proper environment for private investment in research and development rather than providing direct subsidies or major fiscal incentives); Charles Cooper, *Relevance of Innovation Studies to Developing Countries, in* TECHNOLOGY AND INNOVATION IN THE INTERNATIONAL ECONOMY 1, 21-28 (C. Cooper ed., 1994) (tracing shift of emphasis from import substitution to export promotion).

266. Among the diverse factors affecting the overall ability of developing countries to catch up with advanced technical capabilities are the "role of historical accidents, the importance of 'developmental' constraints, . . . [whether] primarily economic . . . or more political in nature, the role of immigration and other 'germ carriers,' . . . the crucial role of governments," as well as the overall macroeconomic potential of states at different levels of development as expressed in trade, industrial activity, growth, and, perhaps above all, per capita income. Soete, *supra* note 29, at 4-13.

267. *See, e.g.*, PETER HALL, INNOVATION, ECONOMICS AND EVOLUTION: THEORETICAL PERSPECTIVES ON CHANGING TECHNOLOGY IN ECONOMIC SYSTEMS 8 (1994); Zysman et al., *supra* note 12, at 185, 187.

268. *See, e.g.*, Soete, *supra* note 29, at 4-5, 12-14. *See also* G. DOSI ET AL., *supra* note 35, at 185, 190-94, 266-70 (finding that the "main mechanism of change over time . . . appears to consist of an evolutionary process of innovation and diffusion of unequivocally better techniques and products," and that "the fundamental international differences relate to the country-specific conditions of technological learning and accumulation" (at 266-67)); David & Foray, *supra* note 157.

mary concern in any effort to boost national competitiveness.[269] To the extent that such efforts depend on selective imports of foreign technology,[270] potential foreign suppliers of advanced technology to developing countries may be encouraged by the existence of stronger intellectual property protection, especially patent and trade secret protection, although the importance of this factor among other economic factors affecting suppliers' decisions may have been overstated.[271] A policy of selective importation can, moreover, be turned into a learning process if local personnel are trained in using, servicing, and maintaining the equipment in question. Such training may lead to longer term associations with suppliers and other firms, and it provides a basis for plugging local personnel into the suppliers' own information networks.[272]

Over time, however, a state's reliance on imported technology becomes a dead end, in part because it may saddle low-tech countries with obsolete hardware that is expensive to maintain while depriving them of the spillover benefits of greater technological assimilation and learning.[273] A challenge for firms in developing countries is thus not to move from imitation to innovation overnight, but rather to make present licensing and imitation strategies productive of as much future innovation as possible, especially by increasing their own capacity to learn from new infusions of imported technology and from the relevant literature and experience available from expert circles abroad.[274]

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269. *See, e.g.*, Cooper, *supra* note 265, at 19-21 (finding that a "[f]ailure of learning processes in developing countries is . . . common" and that firms in these countries are likely to "underinvest in learning processes").

270. *See, e.g.*, Cohendet et al., *supra* note 33, at 68 (stressing that, much of the time, a developing country may want only the goods or machinery that happen to carry the technology in question, plus upgrades, which avoids inefficient duplication of research and development already carried out elsewhere; and noting that duplicative investment in research and development is a social cost of highly developed countries).

271. *See, e.g.*, Mansfield, *supra* note 53, at 107, 111-19. The availability of legal protection seems to affect all the principal methods by which developing countries obtain advanced technology they are not able to produce themselves, including foreign direct investment, joint ventures, technology transfers to subsidiaries, and licensing or franchises. *Id.* at 110-14.

272. *See, e.g.*, Biggs & Levy, *supra* note 262, at 385-86 (case of Taiwan).

273. *See, e.g.*, Freeman, *supra* note 263, at 73.

274. *See, e.g.*, Cooper, *supra* note 265, at 1, 8-9, 16-21. Absent this learning process, the high-tech firms stand to gain not only lead time in competition,

Studies indicate that, when other factors are sufficiently positive, including a critical level of per capita income, it is the diffusion of scientific and technical knowledge that most influences the goals of catching up with and leapfrogging over foreign technological prowess. As diffusion proceeds, the likelihood of incremental improvements and adaptations increases, users' demands become more stringent, and "the effective use of 'scientific knowledge' in improving performance, quality, and reliability" stand to improve significantly.[275] To the extent that technical knowledge emanating from the developed countries is rapidly diffused to properly trained and focused circles in the developing countries, it becomes more likely that internal rediffusion from those circles can enable local enterprises to profit from a lesser degree of path dependence in exploiting the opportunities inherent in new technologies.[276]

When contemplating the role of governments in these broader initiatives, one cannot over-emphasize the extent to which the knowledge needed to embark on specific technological paradigms tends, in its early phases, to be public knowledge, often generated by universities and research institutes. Public investment in both the infrastructure for accessing foreign technical knowledge and in the higher education of those capable of putting such knowledge to use are thus critical components of an appropriate institutional framework for catching up and leapfrogging, even if success of the venture also depends on "constant technological effort and . . . increasing flows of investment."[277]

Although difficulties are still encountered in transplanting technical knowledge from originating communities in developed countries to the different environments found in de-

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as they would with respect to competitors at home through resort to secrecy and intellectual property rights, but further rent for an innovation system already in place. *See, e.g.*, Oddi, *TRIPS*, *supra* note 14, at 458-60.

275. Soete, *supra* note 29, at 13.

276. As diffusion proceeds, "some of the crucial, incremental innovations, resulting for example from user-feedback information, will further shift the technological advantage to the country in which the new technology is diffusing more rapidly." Soete, *supra* note 29, at 13-15. *See also* Biggs & Levy, *supra* note 262, at 373, 383 (strategy of government stimulated learning in cases of Korea and Taiwan).

277. Soete, *supra* note 29, at 20; *see also* Niosi & Faucher, *supra* note 264, at 125 (stressing state's role in training skilled labor).

veloping countries, this aspect of cultural path dependence has become less formidable than in the past. The spill-over effects of basic science are erratic and sometimes unpredictable, and the ever-growing emphasis on primarily industrial innovation and trade in developed countries tends to leave pockets of basic science for exploitation by others.[278] Even though developed countries subject industrial applications to increasingly stringent protectionist barriers, moreover, they remain more willing to share scientific knowledge as such, often in their own interests.[279]

2. *Critical Role of National Information Infrastructures*

The difficulties of transplanting know-how from one cultural environment to another have further lessened in the wake of new possibilities for electronic transmittal and storage of technical information.[280] In the last quarter of the twentieth century, "economies of scale and increasing returns of the overall economic system are likely to be strongly conditioned by the availability of a strategic infrastructure such as telecommunications."[281] By providing cheap "access to informatics and data exchange," advanced telecommunications services "feed the widespread process of introduction and diffusion of incremental technological and organizational innovations in the growing area of applications of information and communication technologies."[282]

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278. *See, e.g.*, LEYDEN & LINK, *supra* note 12, at 1-2 (stressing market failure and inability to capture full returns from creation of information goods); Dosi & Soete, *supra* note 27, at 91, 96.

279. NATIONAL RESEARCH COUNCIL, U.S. National Committee for CODATA, *Bits of Power: Issues in Global Access to Scientific Data*, Executive Summary 7 (forthcoming March 1997) [hereinafter *Bits of Power*] (stating that a "two-way communication capability is needed: scientists in developing countries, like scientists everywhere, generate data . . . as important to science as the data they acquire").

280. "Telecommunications networks like motorways in the fifties, electricity at the beginning of the century, railroads in the nineteenth century, canals in the mid-eighteenth century, are becoming the basic infrastructure of the modern economic system." Antonelli, *supra* note 29, at 5, 6.

281. Antonelli, *supra* note 29, at 6. *See also* Aoki, *supra* note 14, at 1345-46 (stating that "networks will be of the greatest economic and political value to those individuals, groups, and nations with the financial ability and bargaining power to demand and receive instant global information flows").

282. Antonelli, *supra* note 29, at 6. *See also* Paul A. David, *Information Network Economics: Externalities, Innovations, and Evolution*, *in* THE ECONOMICS OF

Digitization and online transmissions via the Internet could thus make specialized, heretofore path-dependent know-how less important in global competition. To the extent that basic science lends itself to industrial applications, databases can facilitate its translation into new technology everywhere, so long as the receivers are otherwise prepared to absorb and adapt it. Even if locally developed know-how remains an important factor in any given technological pursuit, the developing countries' own national policies can influence how effectively any relevant know-how is transferred or acquired.[283] Because the way know-how accumulates is related to the application of intellectual property and competition laws, developing countries can strive to fashion a legal framework that enhances the flow of information along telecommunications networks and that otherwise reduces the constraints of path-dependence and accelerates the transfer of know-how.[284]

From a broader perspective, every rationalized system will seek to foster national and international transfers of knowledge by establishing fluid linkages between industrial and financial policy-making centers and research institutes.[285] The universality of information-driven technologies then facilitates the developing countries' rationalization goals if these countries possess the infrastructure needed to access the flow of

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INFORMATION NETWORKS 103-04 (C. Antonelli ed., 1992) (discussing impact of network externalities on efficient resource allocation and role of regulatory policymaking to enhance performance beyond "level of production . . . attained by the operation of unregulated competitive market processes" alone); Jeffrey K. Mackie-Mason & Hal R. Varian, *Economic FAQS About the Internet*, J. ECON. PERSP. 75, 85-89 (1994).

283. *See, e.g.*, Cooper, *supra* note 265, at 29-34; Biggs & Levy, *supra* note 262, at 383-86.

284. *See, e.g.*, G. DOSI ET AL., *supra* note 35, at 257 (stressing need for less advanced countries to "act directly on both the technological capabilities of domestic companies, and on the appropriability features of the related technologies, in so far as they function as an entry barrier for catching up companies and countries"). A much harder problem arises from the need to time the acquisition of know-how with the developing countries' disparate capacities to exploit it. *See, e.g.*, Soete, *supra* note 29, at 15; *see also* CHRISTIAN N. MADU, STRATEGIC PLANNING IN TECHNOLOGY TRANSFER TO LESS DEVELOPED COUNTRIES 9 (1992) (warning that inappropriately transferred technology may "further retard the social system of the LDC").

285. *See, e.g.*, David & Foray, *supra* note 157, at 29-30, 42-47; Biggs & Levy, *supra* note 262, at 371-91.

scientific and technical data that increasingly supplies the basic building blocks of further technological progress.[286] For example, increased use of electronic publication via the Internet already allows even the latest-comers to access the most advanced thinking and methods in certain fields.[287] These information networks thus become critical tools for breaking through the neo-mercantilistic fences that increasingly surround innovative products and processes in the technology-exporting countries.

However, access to the Internet and the free-flow of scientific knowledge it facilitates only becomes feasible if the developing countries adapt their own institutional framework to the changing universe of digital communications networks and provide the local scientific and technical communities with the equipment to access available sources. Today, the developing countries' own postal and telegraphic systems often pose the greatest obstacles to the flow of scientific and technical information. To the extent that these systems monopolize the telecommunications vehicles, they may provide inferior equipment and service needed to access foreign sources, they may unduly restrict access to the services provided, and they may charge exorbitant prices for such services.

States that seriously aim to rationalize their national innovation profiles will, therefore, make it a priority to provide cheap and efficient means by which the local scientific and technical communities can plug into the global information infrastructure. If, as reputable economists maintain, access to cumulative technical knowledge (including patent disclosures) is the key to catching up and leapfrogging,[288] then accelerating that access by these means may constitute one of the single most efficient investments governments can make in the overall rationalization exercise.

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286. *See, e.g.*, Aoki, *supra* note 14, at 1351 (stressing mobility of intangible skills, information, and information-based products in global market at expense of territorial regulation; but fearing that benefits of new service economy will be captured by "global cities" and those who instrumentalize strengthened intellectual property rights).

287. *See, e.g., Bits of Power, supra* note 279, Executive Summary at 5 (stressing the importance of improving capabilities for electronic communication by researchers in developing countries).

288. *See, e.g.*, Soete, *supra* note 29; David & Foray, *supra* note 157.

At the same time, governments in developing countries should logically support efforts by the scientific communities in developed countries to remove legal and technical barriers to the free and open flow of information across national boundaries.[289] They may also monitor data providers to ensure that scientific data, whether supplied by governments or by the private sector, is made available on conditions that do not overburden local research endeavors.[290] Appropriate competition laws and regulations, formulated at the local level, can restrain foreign publishers who ignore these principles, as indicated elsewhere in this study.[291]

IV. PRESENT TENSIONS AND THE PROSPECTS FOR A FUTURE EQUILIBRIUM

The developing countries' relative indifference to intellectual property rights in the early stages of their development has given way to the need to attract foreign investment into increasingly open markets[292] and to a keener interest in channelling local investment toward applications and improvements of foreign technology that break with the pattern of copycat duplication.[293] This requires a balancing of interests that may result in the adoption of certain policies that today's technology-exporting countries relied on at earlier stages of their own economic development.

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289. *Bits of Power*, *supra* note 279, Executive Summary and Recommendations on Issues in Information Technologies.

290. *Cf.* Reichman & Samuelson, *supra* note 24, at 151-63.

291. *See supra* text accompanying notes 164-180.

292. United Nations Department of Economic and Social Development, Transnational Corporations and Management Division, *Intellectual Property Rights and Foreign Direct Investment*, U.N. Doc. ST/CTC/SER.A/24 (1993) 20-21, 33-34 (finding relation between intellectual property rights and direct foreign investment unclear, but conceding that weak enforcement or tolerance of free-riding can adversely affect investment decisions); Maskus and Eby Konan, *supra* note 53, at 414-16 (finding intellectual property rights a necessary but not sufficient factor in attracting foreign investment); Carlos Alberto Primo Braga, *The Economics of Intellectual Property Rights and the GATT: A View From the South*, 22 VAND. J. TRANSNAT'L L. 243, 251-64 (1989).

293. *See, e.g.*, Adelman & Baldia, *supra* note 3, at 520-33; Takenaka, *supra* note 65, at 30 (stating that, in Japan, the "tendency toward less rather than more protection for patents is about to change").

A. *Balancing Interests at the Local Level*

While developing countries that aim to establish a solid foundation for their own economic growth will necessarily acquire a stake in the evolving transnational intellectual property system, their needs diverge from those reflected in the policies guiding the technology-exporting countries at the end of the twentieth century. Rightly or wrongly, the developed countries increasingly subject technological innovation to protectionist measures and mercantilist policies whose long-term anti-competitive effects could offset the value of trade concessions granted during the Uruguay Round.[294] In general, unless the gains accruing to developed countries from expanding the level of intellectual property protection (and from other protectionist measures) exceed the potential losses to these same developed countries from the diminished capacities of their nationals to compete with less protected intellectual goods on both their home markets and their export markets, current high-protectionist strategies may weaken their overall competitive position.[295]

Progress in the developing countries, in contrast, depends on the maintenance of a suitable balance between incentives to create and the resulting opportunities for free competition, and they stand to benefit most from a balance that errs on the side of competition. In rationalizing their national systems of innovation, the developing countries will accordingly want to gear their intellectual property policies (and related competition law policies) to the pace of their own technological development and to their efforts to accelerate the acquisition of technical knowledge generally.[296] Although intellectual prop-

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294. *See supra* text accompanying notes 14-29; *see also* Aoki, *supra* note 14, at 1345-55.

295. *Cf.* Reichman, *GATT Connection*, *supra* note 3, at 847-48. A broadening of protection in the developed countries' home markets that was not followed by the developing countries would enable nationals from lesser protectionist countries to claim the benefits of higher protection in those developed countries without any reciprocal concessions being offered foreign nationals in the relevant developing countries. *See id.* (citing authorities).

296. *See supra* text accompanying notes 9-13, 33-43; *see also* Frischtak, *supra* note 98, at 89, 103-05. (Although in the past, intellectual property regimes seem to have sprung up in the early stages of capitalist development as a visible adjunct of the invisible hand, developing countries must adapt these

erty policies are still formally rooted in territorial sovereignty, the recent codification of international minimum standards does limit the options available to nation states.[297] If competition policies still remain relatively unconstrained by international law even after the TRIPS Agreement, the need to maintain a favorable climate for foreign investment also sets practical limits to the exercise of even these domestic regulatory powers.[298]

A developing country attempting to potentiate its national innovation system will recognize the interplay between these regimes and seek to exploit such local autonomy as it retains under either regime to promote both innovation and competition. Sometimes the national interest will lie in resisting intellectual property norms adopted elsewhere; sometimes it turns on giving established norms a more pro-competitive tilt;[299] at still other times, it requires states to offset the adverse economic effects of technological dominance by resorting to tailor-made competition laws.[300]

The guiding principle is to meet over-protection abroad with corresponding degrees of lesser protection at home in order to stimulate competitive advantages in exploiting spillovers, leakage, and the products of reverse engineering.[301] However, the needs of local innovators will change over time, and newly industrialized countries may reach a stage where

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institutions to their own trade concerns and their efforts to acquire technical knowledge.)

297. *See, e.g.*, Hanns Ullrich, *Technology Protection According to TRIPS: Principles and Problems, in* FROM GATT TO TRIPS — THE AGREEMENT ON TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS 357, 360-71, 399-400 (F.K. Beier & G. Schricker eds., 1996) [hereinafter Ullrich, *Technology Protection*] (stressing paradigm shift away from territorial regulation of intellectual property rights and need to adjust residual territorial actions so as to maximize benefits under TRIPS Agreement).

298. *See supra* text accompanying notes 157-179; *see also* Gray, *supra* note 179, at 403, 435-36.

299. *See supra* text accompanying notes 50-156, 249-260 (identifying "grey areas" in which pro-competitive approaches may be implemented in local law).

300. *See supra* text accompanying notes 157-179.

301. *See supra* text accompanying notes 181-249; *see also* Reichman, *Compliance with TRIPS, supra* note 6, at 389 ("To the extent that . . . [developing] countries systematically adhere to lower levels of protection . . . their firms may become ever more competitive with respect to those in the developed countries").

they require stronger intellectual property protection than is good for less developed countries.[302] In general, underprotection at home (within the confines of the TRIPS Agreement) will pay off if the gains accruing from greater competition at home and from more competitive products to be sold in export markets outweigh the potential losses attributable to a lower level of incentives to innovate and invest in the domestic market.[303]

Assuming that the developing countries manage to strike the right balance, they may have to work harder to compete under the post-TRIPS regime than before. But, as I have elsewhere predicted, "any competitive efforts that yield a foothold in the world market, and any effective transfer of technology achieved in the process would [likely] . . . yield greater potential returns than at present."[304]

B. *Towards a Transnational Pro-Competitive Equilibrium*

If the institutions responsible for securing compliance with the TRIPS Agreement can successfully manage the clash of interests between developed and developing countries in the short and medium terms,[305] it should allow the positive economic effects of the Uruguay Round to make themselves felt across national boundaries over time.[306] The stronger competitive tides rising in the global marketplace could then gradually influence the business strategies of single firms as much as or more than the economic policies of single nation states.[307] As entrepreneurs in developing countries think

302. *See, e.g.*, Takenaka, *supra* note 65.

303. *Cf.* Reichman, *GATT Connection*, *supra* note 3, at 847.

304. Reichman, *TRIPS and Developing Countries*, *supra* note 8, at 44.

305. *See, e.g.*, Lee & von Lewinski, *supra* note 196, at 286-312; Dreyfuss & Lowenfeld, *supra* note 62.

306. *See, e.g.*, Ullrich, *Technology Protection*, *supra* note 297, at 399-400; *see also* Otten & Wager, *supra* note 6, at 407-13 (emphasizing monitoring and problem-solving role of Council of TRIPS in early years and stating that the "aim is, whenever possible, to resolve differences between countries without the need for formal recourse to dispute settlement").

307. *See, e.g.*, David & Foray, *supra* note 157, at 15-42 (emphasizing that efforts to rationalize national policies concerning innovation cannot proceed in a territorial vacuum, but rather, must constantly be aligned with transnational currents and trends that render territorial boundaries increasingly obsolete). Future success may thus depend heavily on investment in the educational and scientific apparatus needed to apprehend, translate,

more like those who manage small and medium-sized firms in the developed countries, the affinities between them may soon outweigh their perceived differences. This sharing of interests should, in turn, weaken the North-South divisions that characterized multilateral negotiations in the past, and could lead to healthy transnational alliances and networks between small and medium-sized firms everywhere.[308]

Informal alliances and networks of this sort could afford good opportunities for attenuating the market-distorting effects of oligopoly and of the incipient cartellization of research and development in industrialized countries.[309] Alliances with partners in developing countries can help even small and medium-sized firms in developed countries to compete more successfully against large domestic and transnational corporations in their home markets. Such alliances can increase the potential economies of scale for all the partners, and they may eventually permit feedback from developing-country markets to affect the foreign allies' own investments in new applications and improvements at home.[310]

Governments may reinforce these informal networks by encouraging working relationships between local entities and foreign universities, research institutes, and trade associations. When necessary, local investors (and governments) may resort to the worldwide labor market for the skills and expertise in question. To the extent that underemployment in developed countries continues to generate more trained personnel than some of these countries can currently absorb, it creates opportunities for a reverse brain drain that could help to implant

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and implement transnational trends affecting technology and economic development in general. *See id.* at 46-62.

308. In time, for example, "a small pharmaceutical company in India may have more in common with its small U.S. counterparts than with the big Indian pharmaceutical companies" that currently predominate in that country. Reichman, *Compliance with TRIPS, supra* note 6, at 389 (*citing* Adelman & Baldia, *supra* note 3).

309. *See supra* notes 22 & 157-158 and accompanying text; *see also* Bonin, *supra* note 29, at 267, 274 (finding that "larger firms generally enjoy more of an advantage for 'older' products, and younger firms have better chances at the novelty stage").

310. *See, e.g.*, Ross Thomson, *Economic Forms of Technological Change, in* LEARNING AND TECHNOLOGICAL CHANGE 88 (Ross Thompson ed., 1993) (discussing importance of inter-industry links, some of which have produced a variety of new products having a major impact on world markets).

strategically important skills in developing countries.[311] The ability to use cheap unskilled labor in other facets of production may offset some of the costs of this strategy.

The more that developing states increase their access to foreign technical knowledge, the more important it becomes that overly broad intellectual property rights should not unduly fetter local users of that information. This, in turn, will often require firms in developing countries to bargain for licenses with adequate skills and information. It will also require a generally pro-competitive environment within which these transactions may take place, as well as clear base-line regulations that subject technology transfer agreements to fair and equitable conditions.

By the same token, local firms that successfully apply such knowledge to new or improved products of their own will need protection against free-riders who might otherwise appropriate the fruits of their investments.[312] The task of implementing the enlarged framework of international intellectual property standards that bind all members of the World Trade Organization[313] should thus yield a broad range of legal options from which single states can fashion more tailor-made national subsystems once they master the nuances and intricacies of the mature intellectual property models adopted elsewhere. Many of these options were explained earlier in this Article.

The lesson to be drawn from the exercise as a whole is that, while developing countries must comply in good faith with international minimum standards of intellectual property protection, they should self-consciously adopt a defensive, pro-competitive strategy with regard to those standards whose application to specific cases remain open to interpretation. Often this entails no more than taking over a position that leading developed countries previously espoused. As regards important new technologies that fit imperfectly within the existing international legal framework, it also means that the developing countries may preserve and exploit the freedom of

311. *See, e.g.*, Biggs & Levy, *supra* note 262, at 386 (noting Taiwan's efforts to lure overseas researchers by high pay, good positions, and favorable concessions, for later participation in spin-off companies); Aoki, *supra* note 14, at 1351 (stressing high degree of geographic mobility in services sector).

312. *See supra* text accompanying notes 181-249.

313. *See supra* notes 1-8 and accompanying text.

action that results from what I have elsewhere termed the "know-how gap in TRIPS."[314] This, in turn, will require governments to defend the legitimate rights of local firms to reverse-engineer unpatented foreign technologies by honest means.[315]

Even the most pro-competitive approach to implementing international intellectual property rights may prove unavailing, however, if developing countries do not further rationalize and invigorate their antitrust or competition laws. While preserving the bases for healthy competition under local conditions, these reforms may reduce the trade-distorting effects of undue concentration in the developed countries, which higher levels of international intellectual property protection tend to magnify.[316] The developing countries should also consider invoking the doctrine of international exhaustion to combat unreasonably high and discriminatory pricing in certain cases.[317]

In short, the developing countries should assert their rights to compete on fair and equal terms in the global market that emerged from the Uruguay Round of multilateral trade negotiations, in conformity with the gospel of free trade that the developed countries had been preaching for years. As I pointed out in a recent article, the "real question is not whether these countries can compete, even in markets for technological and information goods, but whether the developed countries still have the stomach for stiff global competition once it becomes a legal and economic reality."[318]

To the extent that developed countries opt to shelter manufacturers of high-tech products behind artificial barriers to entry, the allegiance of developing countries to a more pro-

314. *See supra* text accompanying notes 197-249; Reichman *Know-How Gap in TRIPS, supra* note 50, at 786-94. *See also* Reichman, *Collapse of the Patent-Copyright Dichotomy, supra* note 26, at 496-517.

315. *See supra* notes 186-196 and accompanying text.

316. *See supra* text accompanying notes 157-180; Ullrich, *GATT, supra* note 220, at 138 (stating that limitations on compulsory licensing of intellectual property rights as such, although set out in the TRIPS Agreement, "will not work in countries . . . determined . . . to enforce their domestic economic policy by tightening and strictly applying . . . their antitrust rules, patent misuse doctrines, etc.").

317. *See supra* note 174 and accompanying text.

318. Reichman, *Compliance with TRIPS, supra* note 6, at 388.

competitive strategy will in and of itself shorten their catch-up period, promote leapfrogging, and gradually augment their share of the world market for these goods. The more that the developed countries retreat from their historical commitment to free competition as the basic instrument of economic policy, moreover, the more the developing countries will promote the interests of consumers and second-comers everywhere if they maintain a healthy balance between incentives to create and the public interest in free competition in their domestic jurisdictions.

The developing countries may thus inherit the historical role of defending the competitive ethos against overly protectionist demands in all the relevant international forums. If, as one hopes, the developed countries regain their confidence and eventually retreat from current protectionist strategies, then the restoration of more competitive conditions in both developed and developing countries could usher in an unprecedented epoch of investment and technological innovation from which all humanity stands to gain.